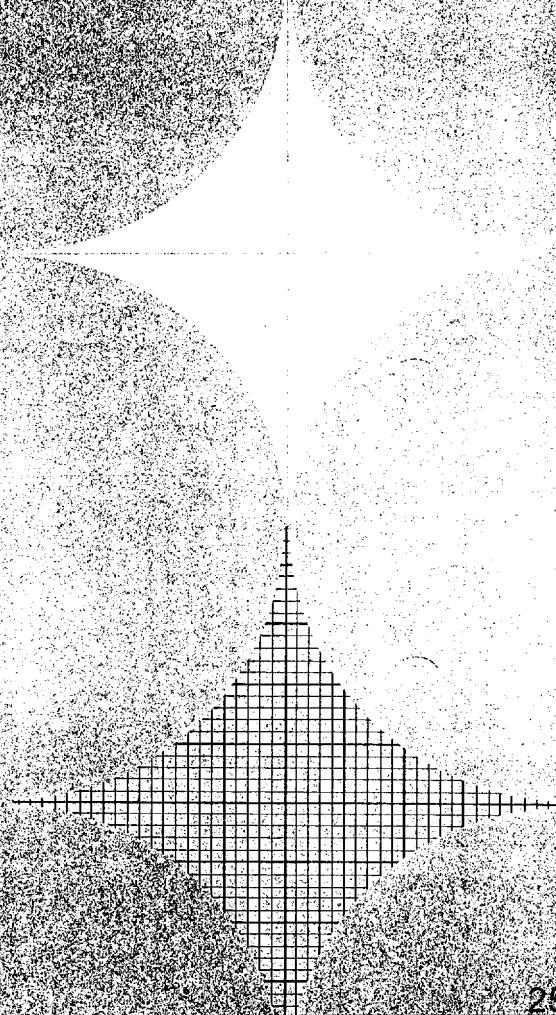


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STATUS STUDY OF  
DATA PROCESSING SYSTEM OF  
DEPUTY DIRECTOR FOR SUPPORT  
CENTRAL INTELLIGENCE AGENCY  
BOOK 1

19 FEBRUARY 1962



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LETTER OF TRANSMITTAL

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Chief, Automatic Data Processing Staff  
Deputy Director (Support)  
Central Intelligence Agency  
1016 16th Street, N. W.  
Washington, D. C.

RE:

16 November 1961

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We are submitting herewith the status report in compliance with the above contract. This report is submitted under three covers, one containing the text, the second containing various charts and diagrams that support the text, and the third containing appendices.

Very truly yours,

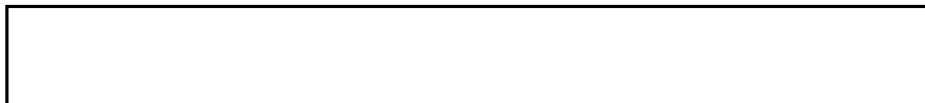
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Project Manager

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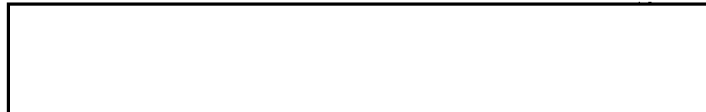
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STATUS STUDY OF  
DATA PROCESSING SYSTEM OF  
DEPUTY DIRECTOR FOR SUPPORT  
CENTRAL INTELLIGENCE AGENCY  
BOOK 1



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19 February 1962

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### ABSTRACT

A thirteen week study to determine the status of the data processing system of the Deputy Director (Support) was initiated in October 1961. The computer based system has never functioned to expectation.

This report delineates the present status by use of charts and descriptions. It points out certain problem areas that have been causing dissatisfactions and inefficiencies within the system. Recommendations are made for actions, over an extended period, which will alleviate the difficulties now found within this system.

It is further pointed out that the anticipated savings in time, costs and personnel have not materialized. This report shows that these expectations were not based on fact and that they have not been achieved. Furthermore, they are not significant factors in the operation of this particular system. It is shown that the requirements must be based on the ability and necessity to complete assigned tasks. Until a comprehensive systems study is completed, it is improbable that any rigorously efficient system will come into being.

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## I. INTRODUCTION

### A. Purpose

This is a Status Study of the data processing system of the Deputy Director of Support (DD/S) as it relates to the RCA 501 Computer located in the Automatic Data Processing Division of the Office of the Comptroller. The major purpose of this study is to answer several questions propounded by the DD/S concerning the achievement of goals that were specified in previous Feasibility Studies made for the DD/S. Another purpose is to provide a status study following the first year of computer operation. The Deputy Director wishes to know whether the objectives outlined in the Management Staff's Feasibility Studies (see Appendix A) have been fulfilled with regard to the matters of reducing personnel and saving money. It was upon the basis of the recommendations of the original Management Staff's studies that a computer was decided upon and the RCA 501 computer was leased. It was intended that this computer would replace the IBM electric accounting machine (EAM) facility then in operation.

### B. Objectives

The objective of this status study is not to prescribe an ideal system for the Agency nor to improve the present system. The

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major objectives of this relatively short investigation are to delineate the present status and to make recommendations for definite action which, if applied, will solve most of the problems disclosed by this study.

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II



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## II. STATEMENT OF WORK

The statement of work for this systems study is as follows:

### A. Scope

1. Evaluate performance and progress of the EDP (electronic data processing) system.
2. Determine present operating costs and good computer time.
3. Report on and analyze the progress being made towards the fulfillment of the original EDP concept.
4. ~~Ass~~ess the likelihood of achieving a savings in manpower, time, and equipment as originally conceived in the feasibility study.
5. Report on the workload--present and future.
6. ~~Ass~~ess the effectiveness of scheduling activities.

### B. Method of Analysis

1. Identify system and computer parameters.
2. Contact all levels of operation within the computing system.
3. Contact the personnel who provide the computer input or use computer output.
4. Obtain users' reactions to present operations.

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C. Reports

1. Report on the computer operations of the Automatic Data Processing Division
2. Report the results of the systems analysis.
3. Recommend various courses of action.

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### III. ADDITIONS TO STATEMENT OF WORK

This contractor, after initial investigation of the system, has decided that it would be in the interests of this report to make certain additions to the Statement of Work. These in no way change the Statement of Work.

The areas covered in these additions are listed in the Table of Contents and include:

|              |                                   |
|--------------|-----------------------------------|
| Section VII  | Model System                      |
| Section VIII | Need for System Indoctrination    |
| Appendix F   | Evolution of DD/S Computer System |

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## IV. DEFINITION OF SYSTEM

In this report, the term system includes the equipment in the computer complex, the users of the computer (those who supply input to the computer as well as those who use the output of the computer), and the operators of the computer. Since this computer is used to provide support services to the entire Agency, almost everyone within the Agency is a part of the system either as a generator of computer information, a user of computer information, or one involved in equipment operations.

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## V. METHOD OF ANALYSIS

The method of analysis used in this system study is specified in section II, Statement of Work. This method has been followed throughout. It is an approach which provided for the obtaining and digesting of the maximum amount of information in the minimum amount of time. All levels of personnel were contacted within the major areas of this study. All of these areas are within the DD/S (Deputy Director, Support) and include the Office of the Comptroller, the Office of Personnel, and the Office of Logistics. The study was made within four major areas, namely, Accounting (which is subdivided into Finance and Fiscal), Logistics, Payroll, and Personnel. Ninety per cent of the information was obtained through personal contacts with people in these various areas. The remaining ten per cent was obtained by mail. The method of personal interview proved most valuable and, from the start, a question and answer routine was used, one question leading to another logical one. A formal questionnaire, prepared at the start of this study, was modified as necessary during the course of the interviews. Questions were asked throughout the various components, cross referenced, and then verified in other areas of that component or other components. Thus, within a short time, it was possible to obtain consistent information. It must be realized in a study of any type, and especially in one of the complexity of this, that the inaccuracy of personal communications must be taken

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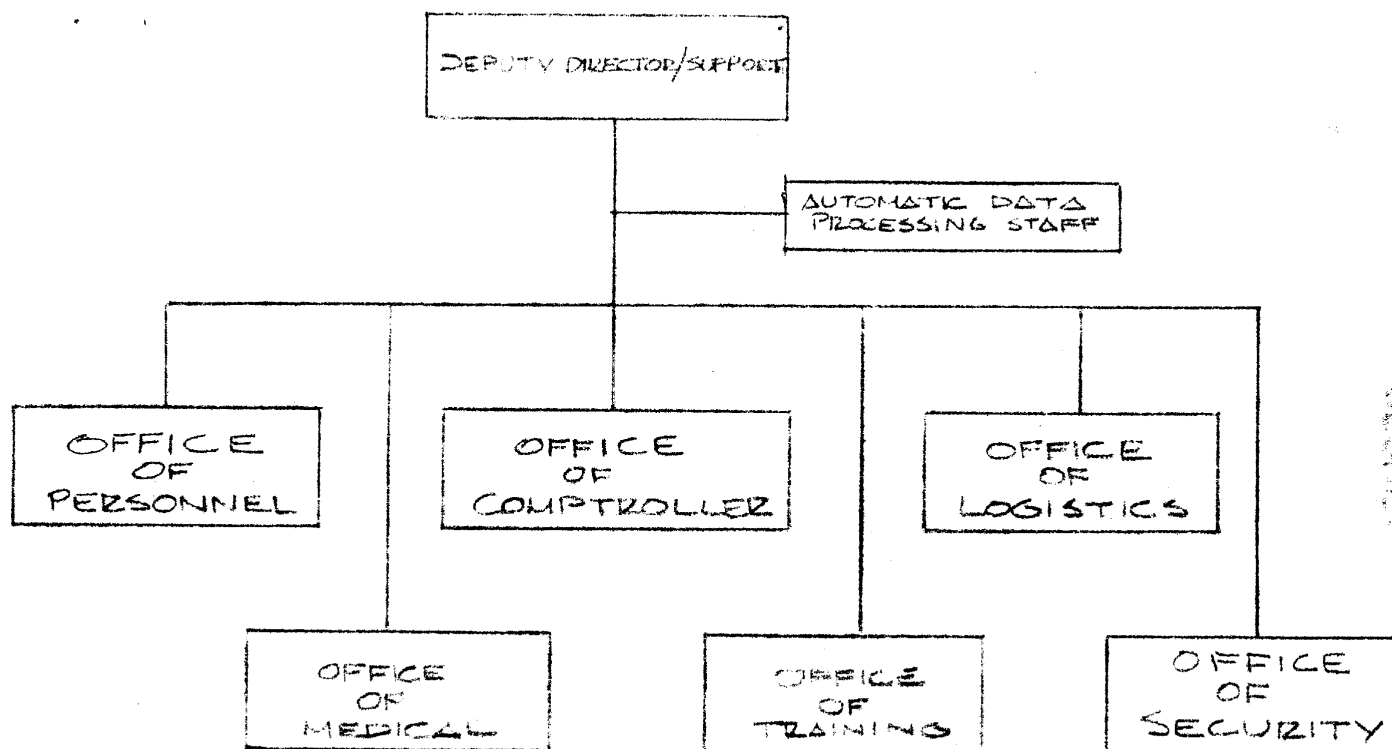
into account. Therefore, it was especially important that information be cross-checked.

The cooperation of all concerned has been much appreciated. It was only through the freely given opinions and statements and demonstrations of operations that it was possible to achieve the results that are discussed in the following sections.

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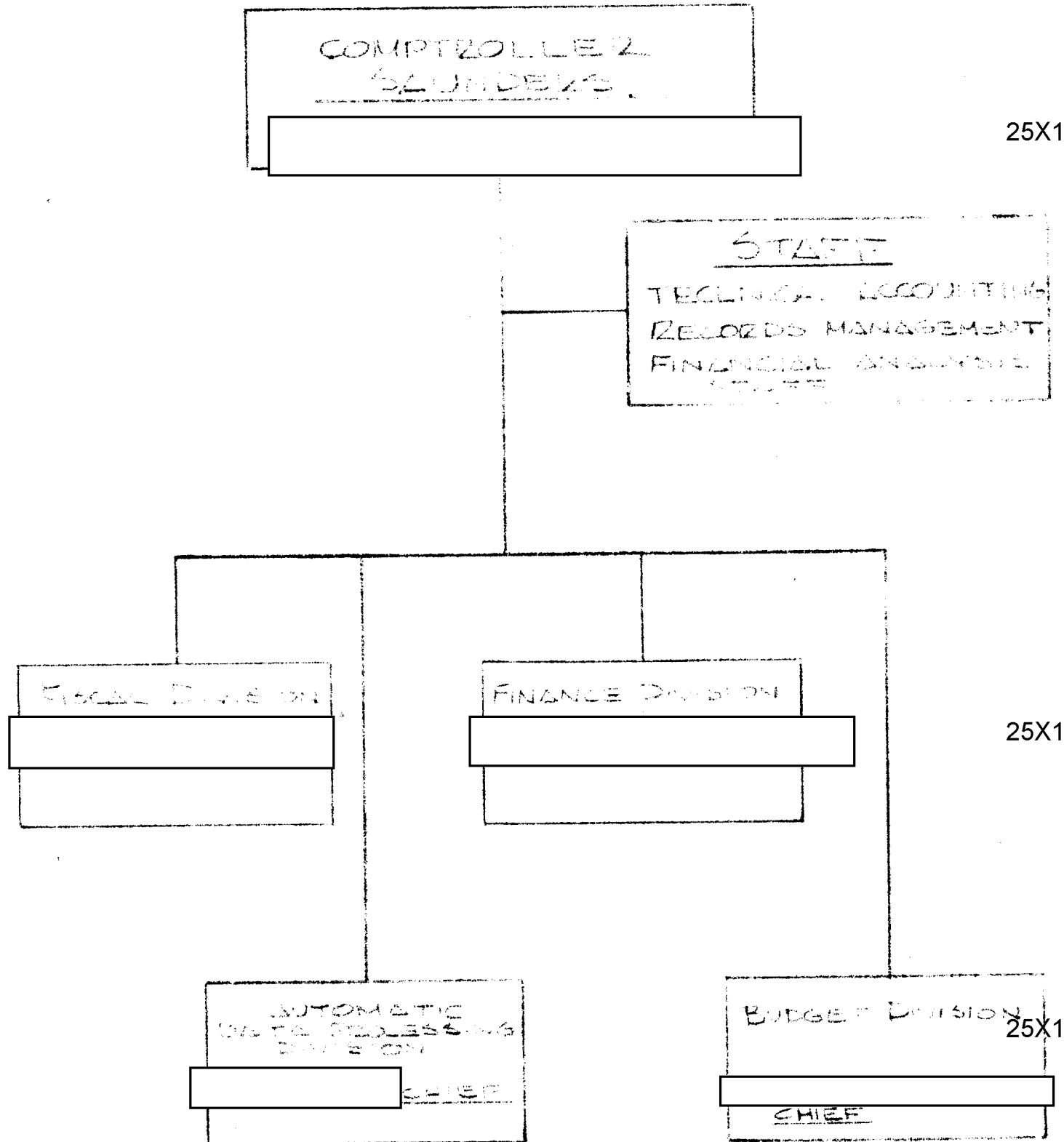
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ORGANIZATION CHART  
DEPUTY DIRECTOR 2 / SUPPORT



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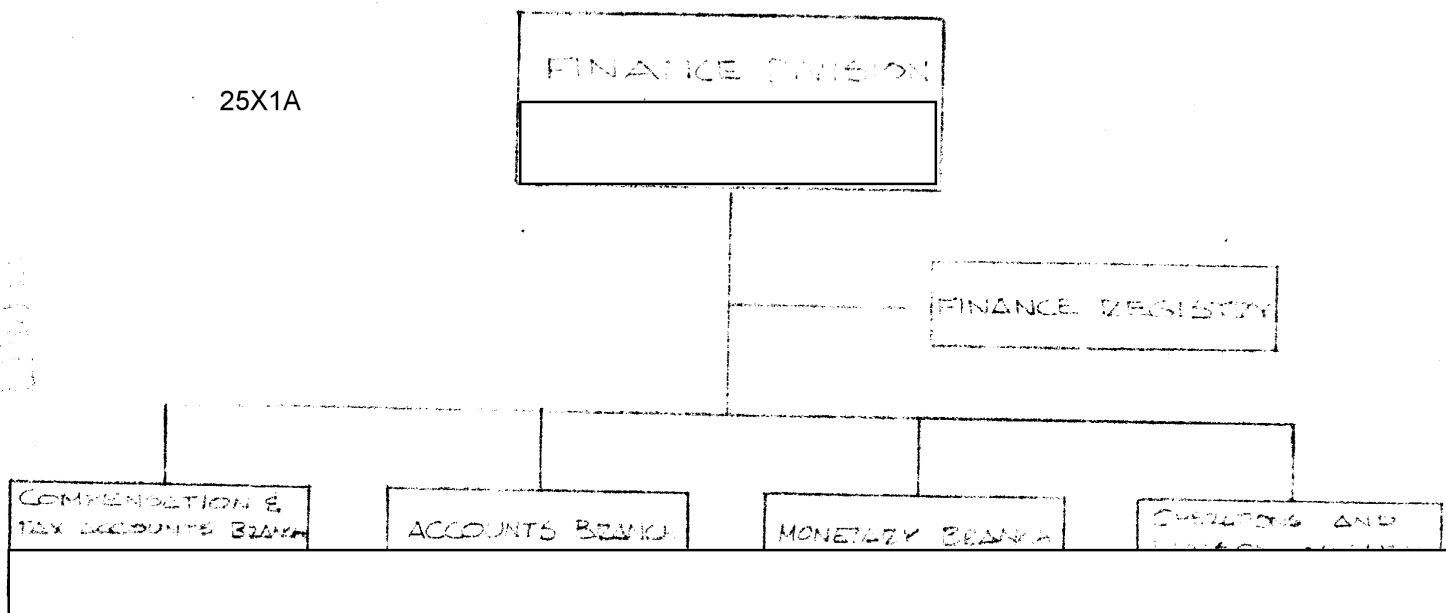
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ORGANIZATION CHART  
FINANCE DIVISION

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FIGURE 3

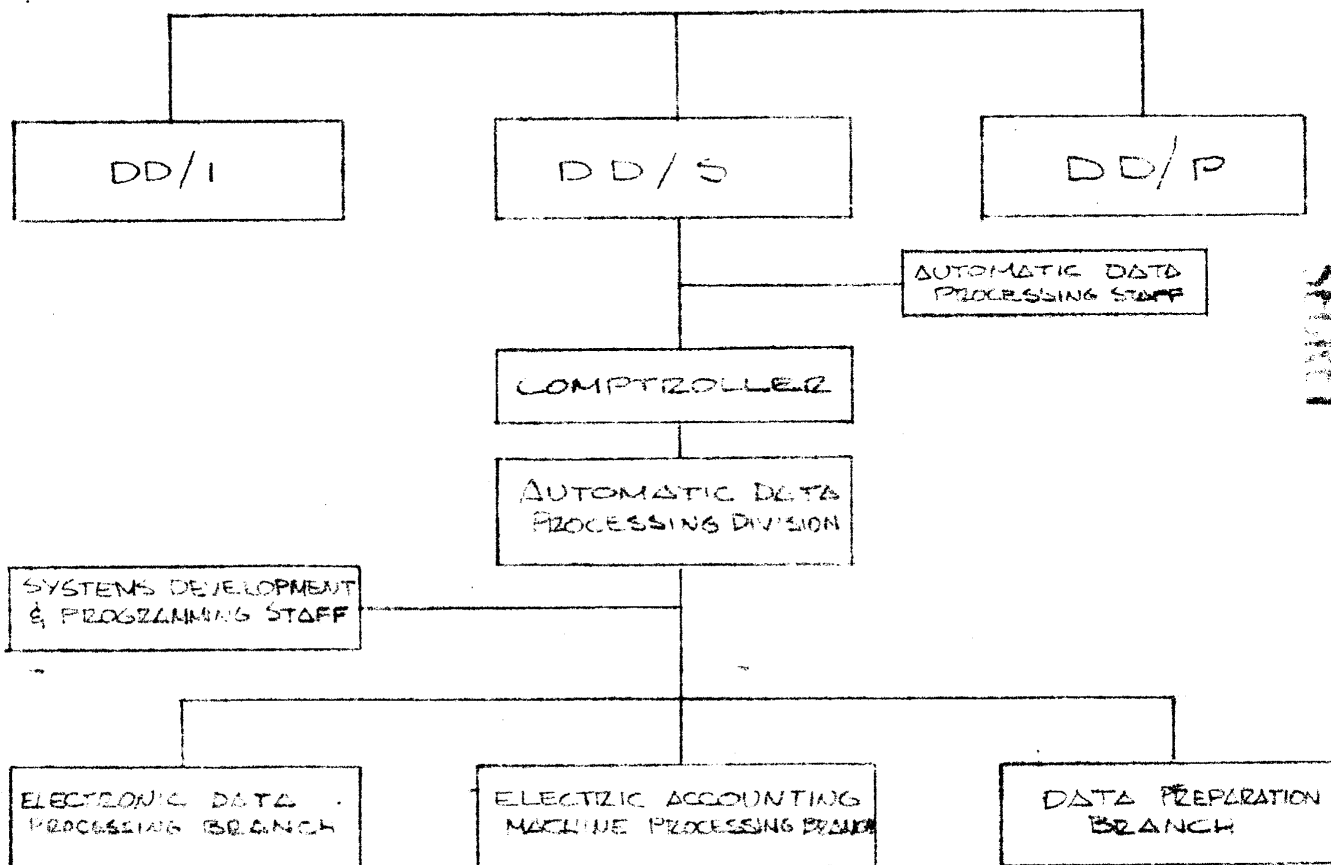
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ORGANIZATION CHART

OFFICE OF THE COMPTROLLER-ADP DIVISION



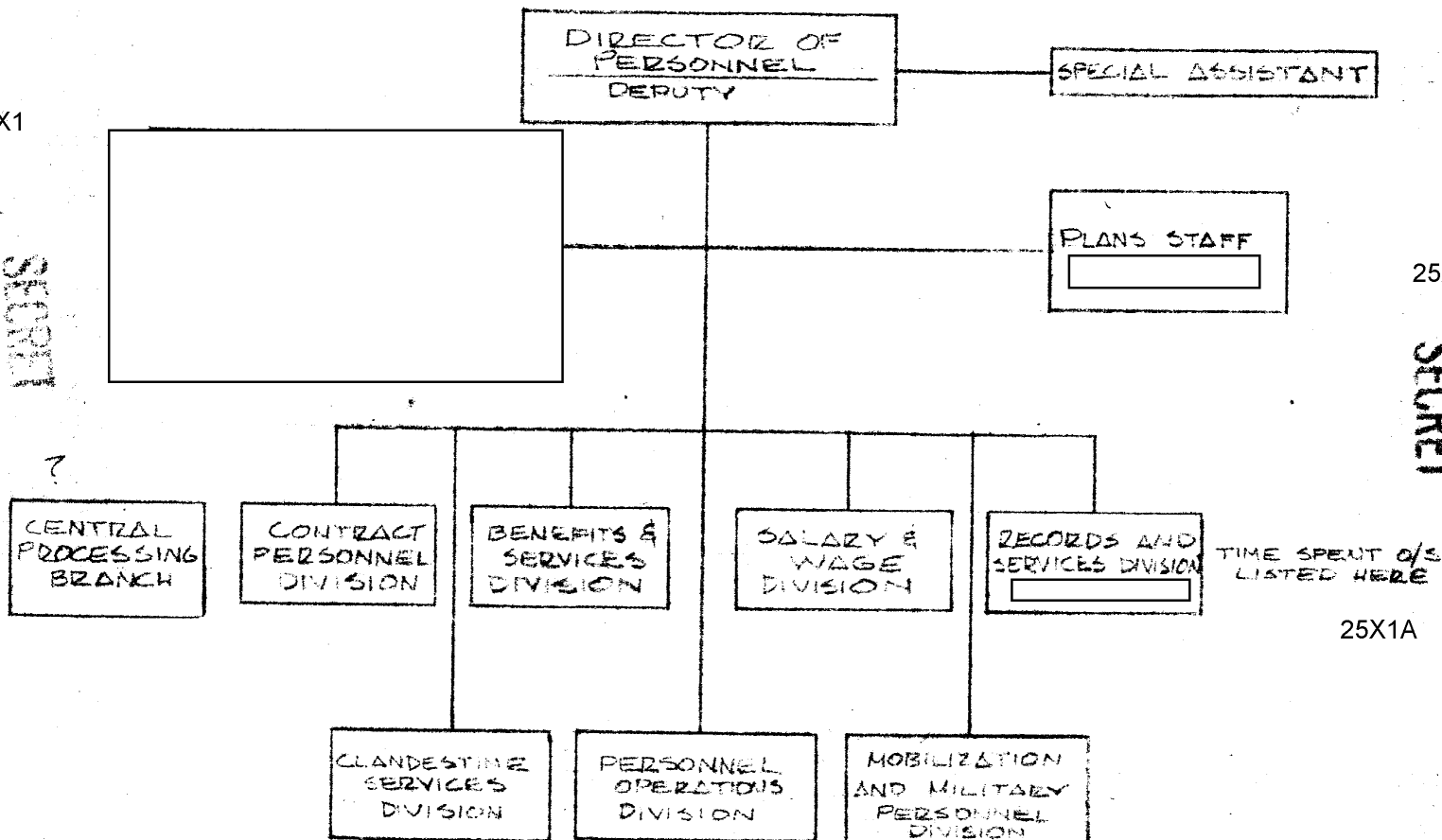
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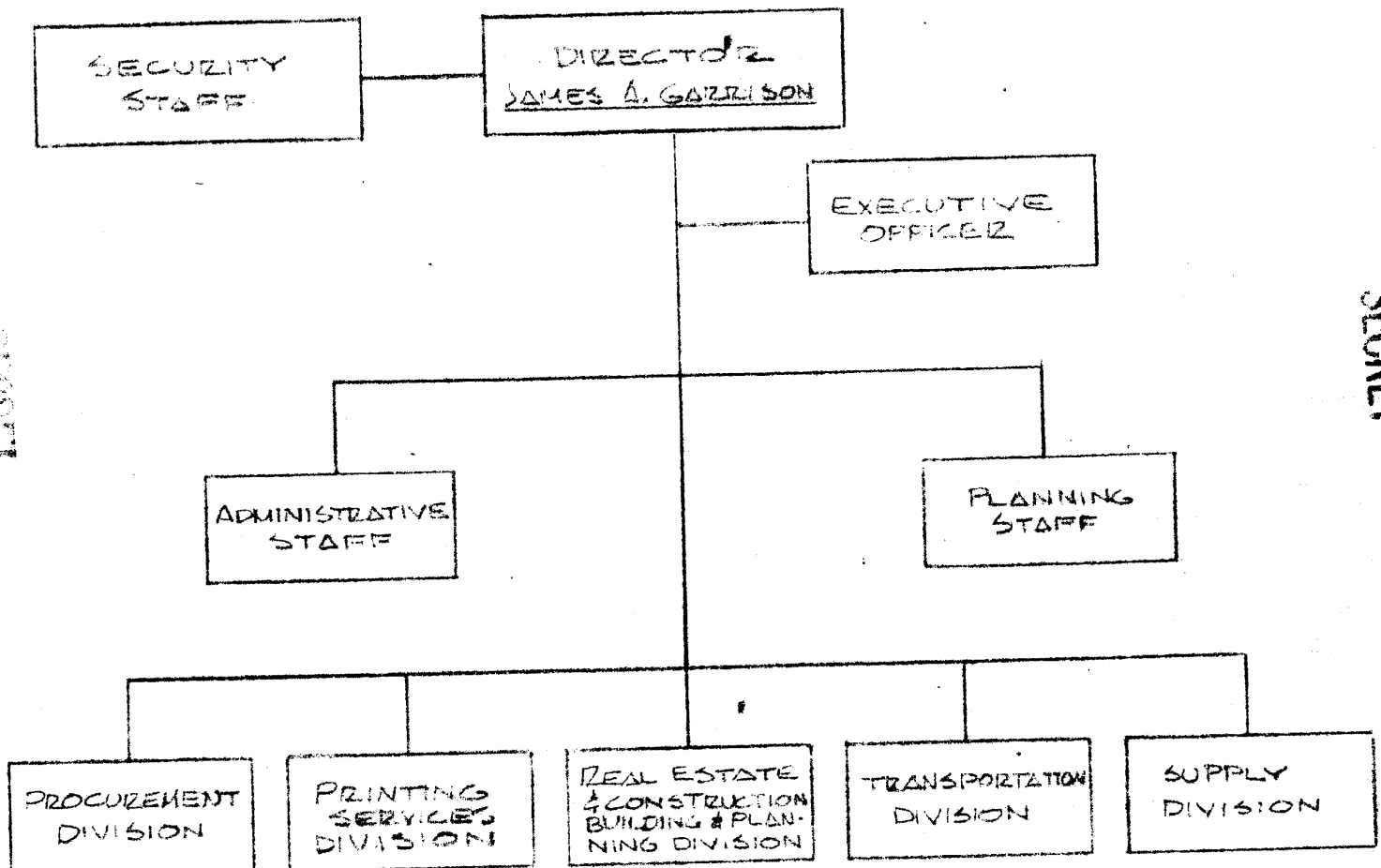
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# ORGANIZATION CHART OFFICE OF PERSONNEL



OFFICE OF LOGISTICS  
ORGANIZATION CHART



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OFFICE OF LOGISTICS-SUPPLY DIVISION  
ORGANIZATION CHART

25X1A

CHIEF/SUPPLY DIVISION  
ORDNANCE TECH. ADVISOR

DEPUTY CHIEF  
MANAGEMENT

DEPUTY CHIEF  
OPERATIONS

FIELD SUPPORT  
BRANCH

INSPECTION AND  
INVENTORY BRANCH

BUILDING  
SUPPLY BRANCH

DEPOT STOCK  
CONTROL BRANCH

STOCK MANAGEMENT  
& CATALOG BRANCH

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## VI. PRESENT SYSTEM

## A. Organization Charts

Figures 1 through 11 describe the organization of the office of the DD/S in some depth, limited by security requirements and the problem boundaries. These boundaries were defined by the electronic data processing requirements. It can be seen from these charts that the organization structure is well defined on the basis of general information requirements for conducting Agency business. What is not evident from these organization charts is the fact that certain functions overlap the organization and therefore, responsibilities may not be well defined in those areas or they may be duplicated.

These functions are listed in Appendix C for comparison with those of the Model System described in section VII of this report. A cursory examination will show that certain areas of information are handled in two offices but are really a single function. A particular example is the handling of the periodic step increase which is a payroll function but is initiated by the Records and Services Division of the Office of Personnel. The Payroll Division then makes the required pay adjustment. Similarly property accounts are handled by both the Office of Logistics and the Finance Division of the Office of the Comptroller.

It should be noted from Figure 6 that the Electric Accounting Machine Branch and the Electronic Data Processing Branch are divided

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organizationally rather than by function. This kind of division permits close liaison between the users and ADPD personnel. Internally, however, such a division for EDP personnel has limited the rate of program conversion. This has been evident from the fact that, although the Office of Personnel has been able to make a large amount of progress in putting all its information processes on EDP, the Payroll Branch of the Fiscal Division has had difficulty, although many information requirements of the Records and Services Division of the Office of Personnel are identical with those of the Payroll Branch. Cross-fertilization of methods and goals would be served more by this functional approach and similar problems would then be handled with greater ease.

#### B. System Flow Charts

Figures 12 through 37 identify the paper work and information processes, lumped under the general heading of system flow. Reference to these flow charts will enable management to determine the present path of information flow.

##### 1. Office of the Comptroller

The functions of the Office of the Comptroller are listed in Appendix C. These are to a large extent similar to those of the model system. A major exception, however, in this system is the division of accounting functions between the Fiscal and Finance Divisions. This division of functions is an outgrowth of the peculiar security requirements of the Agency. They are divided,

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generally speaking, so that the Fiscal Division handles accounting information of a general business nature, whereas the Finance Division handles the same accounting functions for information of a specialized and security-oriented nature. In addition, the automatic data processing function is in the Office of the Comptroller, in accordance with the recommendations of several of the Management Staff studies (Appendix A).

a. Finance Division

The Finance Division has a multiplicity of functions which can be generally labeled: payroll and accounting. As indicated above, these functions are, generally, security oriented. It should, however, be noted that all property accounts are maintained by the Finance Division, although many property items also show up in the Fiscal Division Accounts Branch records.

(1) Payroll

The Compensation and Tax Accounts Branch of the Finance Division is responsible for the unvouchered payroll. People are paid under several different classifications. These break down into staff, em-

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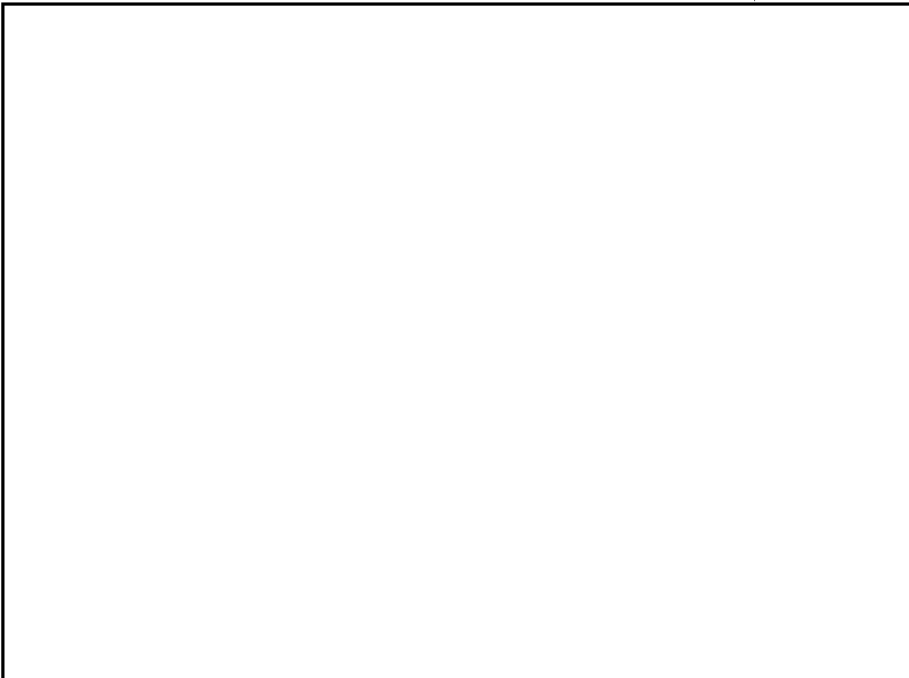
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(2) General Accounting

Figure 12 illustrates the flow of expenditure accounting in the Accounts Branch of the Finance Division. Its main obligation is property accounting since all property accounts are controlled by Finance for security purposes. Additionally, its functions are those of a general accounting system modified for security needs.

b. Fiscal Division

The Fiscal Division is concerned with vouchered funds and is subject to GAO audit. The Fiscal Division responsibilities lie in the areas of payroll records and disbursement, payment of invoices, and accounting functions controlling these responsibilities.

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(1) Payroll

The payroll function for vouchered funds is handled by the Payroll Branch of this division. It is of interest that the salary scale and other personnel fringe benefits, such as, retirement, health, and life insurance, conform to Civil Service rules. Figure 15 illustrates the method of time and attendance recording and auditing by the use of T and A cards. These T and A cards are distributed by the Payroll Branch to T and A clerks of the operating components at the beginning of the pay period. The clerks have the responsibility of maintaining daily attendance and leave records on these cards.

The T and A cards then become the official record for pay issue. All T and A cards must, in addition, show the cost center to which the individual has charged his time. This becomes the basis for cost accounting with respect to personnel changes. Other information requirements of the Payroll Branch are shown in Figures 16 and 17. Thus, the Form 1150 Notification of Personnel Action is transmitted from the Office of Personnel to Payroll to inform Payroll about all changes in pay status of the individual. Of

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particular interest is the fact that Personnel is presently changed with initiating action for the Periodic Step Increase because Payroll Branch does not as yet have enough information to undertake this function independently. This information should eventually be made available to Payroll directly from a computer master file.

Some representative reports required by the Payroll Branch are:

1. Payroll roster by cost center
2. Military leave roster
3. Jury duty roster
4. Excess sick leave roster
5. Overtime listing
6. Individual Earnings Record
7. Individual Leave Record by Pay Period
8. T and A card listing

Figure 18 describes some of the problem areas found in the Payroll Branch.

(2) General Accounting

The auditing of bills and payment expediting for the Fiscal Division are handled by the Claims Branch and Fiscal Processing Branch respectively.

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The Fiscal Processing Branch acts, in addition, as a clearing house for mail inquiries and paperwork routing for invoices, purchase orders, and contracts. In addition, it has the responsibility of initiating payment vouchers both for individual payments (voucher abstract) and for batching obligations on the Voucher and Schedule of Payments (Form 1166) for transmittal to the Disbursing Branch. Figure 22 shows the sequence of initiation of these information items, their collation for auditing and certification by the Claims Branch, and their decollation for payment and accounts posting by the Disbursing Branch and the Accounts Branch of the Fiscal Division, respectively.

The Claims Branch is the invoice auditing branch for the Fiscal Division. It handles all charges except those for travel. The Claims Branch receives the documents regarding an obligation, from the Fiscal Processing Branch. These include the invoices, the purchase order, voucher abstract, receipts, etc. (Figures 19, 20, 21). The Claims Branch checks all documents against the terms of the purchase order or contract or purchase order, with respect to price,

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numbers of items, types and qualities as designated in the invoice and receiving documents. The Claims Branch then enters on the contractor purchase order, the amount of the invoice, and the balance. All papers are then sent back to Fiscal Processing Branch where they are listed by voucher number on Form 1166. This comes back to Claims Branch for certification. Fiscal Processing then relays this Voucher and Schedule of Payments, where several vouchers may be listed irrespective of payee, to the Disbursing Branch.

The number of vouchers handled is recorded by each auditor on a daily inventory form which is totalled at the end of each week and summarized in the Claims Branch Production Report. Additionally, the Claims Branch has the responsibility to pay invoices within the allotted time required for discounting. At the present time, the discount is lost in 15% of vouchers because of the delay in transmitting receiving documents from warehouses. Two occasions saw this loss at \$350. and \$500. respectively. The Disbursing Office requires that vouchers be in its hands by 10 A. M. of the day preceeding the drawing of a check for payment.

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Contracts are made with individuals as well as business organizations. When these are completed, the Claims Branch runs a tape on the total contract and sends a notice of final payment (Form 183) to the contracting office. This tape run may be quite time consuming since every invoice must be included.

Contracts with individuals present an additional problem in that no income tax is withheld and a Form 1099, U. S. Information Return (tax) must be filed in January. Thirty-four continuous hours are spent during January typing Form 1099. End-of-year auditing requires 131 hours, half of this must be accomplished on overtime. Thus, contract liquidation and balance figures are now entered and totalled manually. This job is particularly pressing in January and at the end of the fiscal year because of the required number of year end reports. Electronic data processing methods are eminently applicable to the updating of contract liquidation and balance figures. This information could be made available in a periodic listing. Similarly, the completion of the U. S. Information tax return, showing income tax obligations of individuals now withheld, could be accomplished by EDP.

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Other reports of the Claims Branch are:

- (1) Record of Documents Destroyed
- (2) Record of Paper Sent to Records Center
- (3) Annual Report on Tort Claims (Public Law 79-601)
- (4) Grants for Scientific Research

The forms list shows other reports which are self-explanatory.

The Fiscal Division's Accounts Branch operations are similar to a general government agency accounting function. It is charged with the maintenance of allotment accounts and expenditures by object class. Its ledgers are divided by allotment number and cost centers. Cost centers are used for charging of property, material, and personnel costs to a budgetary allotment. They are sub-accounts of allotments. Most of the Accounts Branch information processes are manual. Among the reports it is responsible for, and which are made up by electric accounting machine methods, are:

- (1) Unliquidated Obligations Summary by  
Object Class
- (2) Report of Allotments, Obligations and  
Expenditures by Object Class

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- (3) Form 1733, General Subsidiary Ledger--  
Summary of all payment vouchers audited  
and approved for payment.

Its allotment ledger cards are made up on a National Cash Register bookkeeping machine. It handles 275 cost center accounts, each cost center ledger is three to four pages long. Allottees receive a copy of each allotment ledger sheet.

c. Automatic Data Processing Division

- (1) Electric Accounting Machine Processing Branch

This is the IBM card-based automatic accounting system whose responsibility it has been to meet Agency requirements for all types of accounting and statistical operating reports and documents. As indicated by its organization chart, it has responsibilities to all offices of the Deputy Director (Support). The flow of information and its processing (sorting, collation, arithmetic procedures) are illustrated in Figures 23 through 31. These are exemplary rather than comprehensive.

The programs and sequencing of operations for the 501 have been based upon those already in use in the EAM procedures, in many cases. In some areas such as Fiscal Payroll and Personnel Qualifications Records, this one-to-one conversion philosophy has

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not worked out satisfactorily.

(2) Electronic Data Processing Division

The RCA 501 Computer System was installed October, 1960. It was ready for operation by March, 1961. Almost all programming was done by ADPD personnel with some assistance from RCA representatives. There is one RCA programmer assigned to assist ADPD at the Central Building. Stock programs from RCA have been limited mostly to service routines. No compiler program has been used. It is, however, expected that Cobol will be used exclusively in the future. The present programs are satisfying Agency requirements in a limited way. They are mainly non-optional programs converted directly from the EAM system (see above). It is expected that these programs will be reworked, using Cobol. The conversion from EAM to EDP has not been completed.

No attempt has been made to determine whether present listings and programs can be reduced in volume because of duplication of information. It has been mentioned above that the EDP Branch is organized so that its programmers are grouped according to responsibility to a particular user rather than an information requirement. Much information required for

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the Office of Personnel, for example, is also required for payroll processing; yet each office uses programs entirely independent of the other. Similarly, Finance Accounts records are dependent to a large extent upon transactions of the Office of Logistics; and, therefore, there should be the closest coordination of programming effort between members of EDP assigned to do their work.

Computer time is now divided on a 60-40 basis with the major part going into production runs and the remainder into debugging of new programs. The service of the 501 computer and peripheral equipment has not been satisfactory. The computer main frame does have an excellent record for reliability. The peripheral equipment has been troublesome. The Model 527 Printer and Model 538 Card Punch, although used infrequently, develop trouble while a job is running or at the time it is tested before running.

Master records are now maintained on magnetic tape where programs have already been converted from EAM to EDP. The fixed 80-column card format can be modified because the tape permits use of variable-data-length recording.

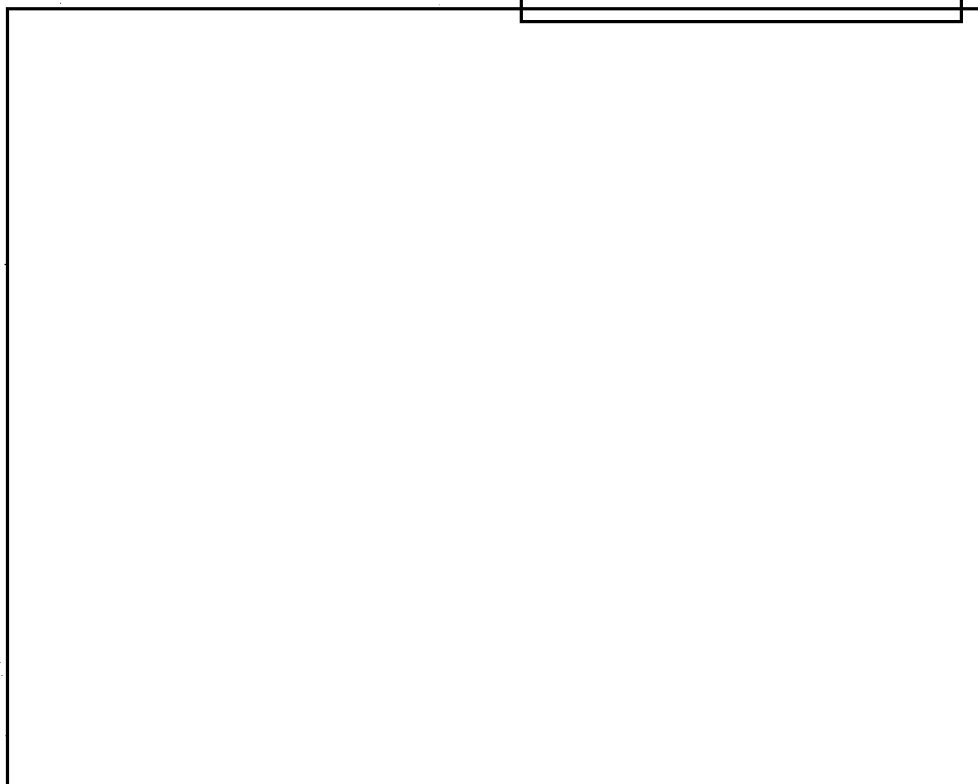
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The Payroll Branch of EDPD handles two types  
of payroll: Payroll I for overt members of the staff,  
Payroll II for covert people.

25X1

25X1



There are additional payroll listings which  
include: Contract payroll, tax listings, deduction  
listings, and Individual Earnings Records listings.  
EDP personnel state that payroll processing time  
is doubled by the need for allotment number listing  
and processing for the Individual Earnings Record  
master file.

The total computer running time for October  
was 330 hours, of which 55 were used by the Automatic  
Data Processing Staff. The standard month is 200

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hours. Computer output is destined to increase although computer time requirements may fluctuate depending on the increase in program efficiency expected to result from the efforts under Phase II. It should be noted that the ADPS requirement for 55 hours only appears quarterly.

As for the increase of computer output, certain items required for payroll control are now done manually but will later go on EDP. Pay this Period, cancelled check reports, Periodic Step Increase Information are examples of the control information that will go on EDP. An additional payroll will be put on in about six to eight months. It involves exceptions to Payrolls I and II and two types of checks. In addition an Individual Earnings Record listing may be required monthly.

## 2. Office of Personnel

Only two units of the Office of Personnel were covered on this survey. These are the Records and Services Division and the Qualifications Analysis Branch of the Personnel Operations Division. Figures 31 through 34 are representative illustrations of the flow of personnel information in the Records and Services Division. Appendix C lists the functions of the Office of Personnel.

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a. Records and Services Division

The Office of Personnel is responsible for more than 107 different reports of varied frequency and length. The most widely distributed report is the Position Control Register (Figure 34) which is printed monthly by the Records and Services Division for the Deputy Director/Plans only. Thirteen copies of this report are distributed quarterly to the other administrative offices. The source information is taken from Form 1150, Notification of Personnel Action, which accompanies all changes of personnel status and Form 261 which contains information about the job and table of organization and is initiated by the Salary and Wage Division.

The Position Control Register is a highly useful document. It is used extensively as a personnel inventory in place of other qualifications records that must be retrieved manually at present. Form 1152, Request for Personnel Action, is often initiated on the basis of the information in the Position Control Register.

The Position Control Register is also used to measure the average grade in an organization for budgetary and classification control purposes. If a reorganization is undertaken, the practice is to maintain the average grade of the personnel of the component. Similarly, controls

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are kept on promotions by maintaining the average grade of a particular job classification and also the average grade of an administrative unit.

Most of the other reports are used for compiling statistics and providing analyses of applicant and personnel distribution for purposes of planning recruiting drives, evaluating average personnel costs, planning replacements for people slated to retire, averaging grades for re-organization control, supporting Career Services functions, control of promotions, and many other job and personnel requirements. Examples of other types of reports used by the Office of Personnel:

Separation Roster - monthly (by office and alphabetical)

Promotion, quarterly and summary report by office

Yearly Medical Examination Roster (all grades above 12 are examined)

Periodic Step Increase Roster

Entrance on Duty -

Alphabetical listing monthly

By Office, alphabetical

Quarterly tabulation by Career Service

Terminations - by job (not distributed)

Semi-annual Total History Report - each individual

listed showing age, promotion history, career

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service, office

### Summary Reports - Agency gains and losses

Figures 27 and 28 illustrate how these reports have been compiled by the EAM Branch of ADPD.

The Records and Services Division has been very successful in its conversion program from EAM to EDP. The greatest difficulty encountered in the use of EDP methods has been the unsatisfactory performance of the printer for the 501 System. Personnel lists are generally voluminous, having many columns across the page. The printer has provided copy in very poor register so that lines across the page are very wavy, making it exceedingly difficult to read the lists. The Records and Services Division has had to abstract information from these listings, or retype whole sections in order to provide the information to users in a useful condition. Additionally, Personnel uses these listings to formulate and write analyses of personnel trends and problems for planning purposes.

At the present time, the 501 is at the Central Building while the decollator is at Curie Hall. Two days are lost delivering Personnel reports because of the need for having them transferred between Central, Curie Hall, and finally the Agency's new main building where the Records

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and Services Division is located.

Among the responsibilities of the Office of Personnel is the reimbursement of Department of Defense for military personnel assigned to the Agency. The military complement is paid by the Department of Defense.

Promotions for Career Service Personnel (Figure 33) and position status changes are controlled by the Career Services Staffing Authorization. Controls are kept on promotions by the average grade of a job and average grade in an operating division. In the case of unit reorganization, the average grade in the unit is maintained. Although estimates differ, the Personnel Records and Services Division estimates that the average turnover in the Agency, including professional people, is [ ] of the Agency strength. Clerical turnover is, however, about [ ] 25X1

There are still certain information bottlenecks which have not been surmounted. The date of PCS is not yet available. Listing by employee serial number has not been programmed yet. [ ] 25X1

25X1C

[ ] funds. This is, however, a matter of record in the Financial Division of the Comptroller's Office but is not

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available for distribution.

b. Qualifications Analysis Branch

The most important and sensitive information available to Agency administration is its knowledge of available personnel capabilities. Yet this information is not centrally controlled. It is presently handled on an organizational component level because these components have formerly found that persons having desired qualifications for a specific job which had to be filled on short notice could not be called from the central files. This insufficiency was caused primarily by the inability of the Qualifications Analysis Branch of the Office of Personnel to cover a sufficient number of descriptive categories.

The Qualifications Analysis Branch has submitted a ✓ proposal for a complete system redesign of the method of recording, storing and retrieving these records of personnel with desired qualifications at short notice. It is essentially a coding system which may be programmed for computer search and which permits a vast expansion of the number of descriptive elements available for evaluation of the background and experience of each individual.

There appear to be two immediate problems with regard to the proposal. The first is the completion of

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biographical profiles of all personnel. The second is <sup>(2)</sup> the design of the retrieval system. The coding system has already been devised which would permit the storage of the biographical information on magnetic tape. It would also permit setting up a manual filing and retrieval system based upon edge markings compatible with the proposed coding system.

The completion of the biographical profiles is a matter of organization action. The development of a retrieval system for personnel selection is a matter of design choice. The latter may be accomplished in a number of ways depending upon several factors such as availability of the computer at short notice, the number of qualifications to be stored and examined, acceptable methods of record storage and others. One method may employ the 501 computer. In this design, the individual and his record card are identified by number and his qualifications by a computer readable code and the record is stored on magnetic tape. Coded qualification requirements are then entered into the computer for matching with those on the tape record. Employees are selected by number and matching codes. The present proposal put forth by the Qualifications Analysis Branch would proceed to print, from computer stored information, the complete quali-

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HAS THERE BEEN AN  
ADEQUATE DERIVATION  
BY MANAGEMENT OF  
THE PURPOSES THE  
QUALS. REGISTER IS TO  
SERVE?

NEED ALL INFO ABOUT  
EVERYBODY IN ONE FILE?  
CAN'T FILE BE FRAGMENTED  
INTO SUBSYSTEMS, EACH TO  
SERVE A PARTICULAR PURPOSE?  
OR GROUP OF PURPOSES?  
IS THE EMPLOYEE THE KEY-  
OR IS THE QUALIFICATION  
REALLY THE KEY?

OFF LINE PRINTER

NEED SUBSYSTEMS?

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fication records of individuals so selected. Presumably printing would be done off line. That is, first a magnetic tape file would be made containing the whole record; the tape then removed from the computer, freeing it for other work and put on an off-line printer.

The use of a flexowriter to print out a biographical record <sup>will</sup> may, however, be excessively cumbersome for this type of job, since the biographic record may be several pages long. In addition, the storage of a complete biographical record on each employee would require approximately six reels of magnetic tape although the coded data for searching could probably go on a single reel. An alternate method of performing the same function would be to use the biographical profile itself as a master copy. The computer then need only print out a list of names or employee serial numbers to indicate which biographical profiles will have the desired qualifications. The biographical profile, original or xerox master, is then pulled for duplication and returned to the master file.

There are several systems which may be applied to the selection of personnel by coded qualification record that do not require computer handling.

Coding and selection may be done by the use of edge punched cards. The longer biographical profile containing

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the complete dossier is here also, kept in a master file. The items used for selection purposes are encoded or listed on a card and the edges punched so that, by the use of a needle, selections can be made according to any list of requirements. Royal McBee Keysort is the classical example of this procedure.

The Peekaboo System is another non-machine method which lends itself well to selection by requirements. In the Peekaboo System, a card is coded for up to 10,000 numbers, which may represent each of 10,000 employees. Each specialty, requirement, or descriptive item is represented by one of these cards. Each employee who can be described from his biographical profile by the particular specialty or other descriptive item is then shown on the card by a punch-out hole on one of the 10,000 slots corresponding to the employee or his number. When people of a particular trait or background are required, the card showing this background is placed against a light box. All persons having this requirement are then picked out by the position of the light passed by the holes. If more than 10,000 employees are listed, a second card for each requirement is made and searched. As the employees meeting the requirement are identified, the biographical profile is pulled from the master file for

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duplication and distribution. The original is returned directly to the file.

Although the 501 is available, it is presently overloaded; and it would appear that some time will elapse before the Personnel Qualifications Record Program could be put in working order. Thus, time is presently available for a more thorough examination of the usefulness of the computer in this problem. The total number of employee or consultant records in the files, the number of requirements that are to be placed against the selection process, and the number of selectees that are expected from the file during any search should be considered. The one particular problem which a manual system will obviate is scheduling. A request for selection of possible incumbents to fill the requirement may, if necessary, be acted upon immediately in the manual system. The computer-based system, because of its limited access and channeling, would probably require special scheduling, program loading, and other special processes, including tape encoding. This delay may not be a problem if immediate information is not often required. Instituting a manual selection method would probably not be any more expensive than programming. On the other hand, the handling of

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master files manually may not be desirable because of possible loss or misfiling of individual records, which would not happen to a magnetic tape file record.

Of paramount importance, however, is the number and kind of summary reports and listings that might be required from the qualification record file. A manual system does not lend itself to the sorting and accumulation of list information in a way that a computer does. Periodic listings of employee population characteristics and frequency, summary information regarding turnover of people with certain specialties, summary information of talents available to the Agency, would all be done best by machine computer listing. If such listings must come out of the  then manual methods 25X1 may be excessively cumbersome and the use of the computer highly desirable.

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### 3. Office of Logistics

The functions of the Office of Logistics are listed in Appendix C. The Supply Division represented the only area of interest to this report. Its most important document produced by the EDP system is the Stock Status Report.

#### a. Supply Division

The Supply Division requires immediate information of stock status in response to inquiries and requirements which are always coming in through all channels of communication. At present, the Stock Status Report is listed monthly by the Electronic Data Processing Division. The list is updated manually during the month so that immediate status information is available upon request. The list consists of 56,000 lines, and spaces are left between line items to permit manual posting for inventory updating. (See "Depot Stock Control Branch Procedures" Section I Chapter 5 - Procedures for Maintenance of the Stock Record Account.)

Changes in physical inventory are a result of requisitioning, procurement or adjustment. The flow for accomplishing these basic functions is shown in Figures 35, 36 and 37. Changes in the recorded inventory may take as many different forms as there are

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codes in the code book. These may be changes of nomenclature, condition code, sterilization code, expendability, unit price, packaging code, procurement code, traceability code, accountability, etc. Figures 29 and 30 illustrate Electric Accounting Machine Division procedures for adjusting and updating the master file.

Nine copies of the Stock Status Report are printed. Each copy contains 6,000 pages. The only copy which is updated is that of the stock analyst. All other copies are incorrect with respect to any item which has been requisitioned, replenished or adjusted at any time after the monthly printing. Inquiries are made to the Chief's office of the Office of Logistics and that of the Supply Division, in both of which these monthly copies are kept. Reference to these copies can be made only for administrative information. Stock status information must be referred by either of these offices to the stock analyst.

Another problem in the use of the Stock Status Report is its bulk and the delay caused by the manual search process. Since all stock information is eventually put on IBM cards, it is justifiable to look at

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these IBM cards with regard to actually using them for stock status recording and information at the stock analyst's desk. This is an application of unit record keeping. All items against which transactions are recorded during a day could be separated for repunching and machine record updating. If the number of transactions per day is limited, the inter-filing of cards could be done manually. In this way, the cards would daily represent a master file from which the latest stock status report could be printed at prescribed intervals. If the volume of transactions is such that it is not feasible to interfile manually, the whole file of 50,000 cards could be passed for sorting and collating by machine methods. This, however, would consume 3-1/2 to 4 hours. The frequency of repunching of cards could then be reduced and manual updating of cards could be accomplished as at present. Again, at any time a new list is required, only the cards for which transactions have been made need be repunched, followed by punching of the entire file.

The management report for the acquisition of the IBM computer identifies many areas of the Office of Logistics procedures and reports which can be

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modified. No doubt some of these changes have already been made. DMJM's review of this report is found in Appendix A.

b. Inspection and Inventory Branch

In addition to its inventory responsibilities, (see Figure 37) the Inspection and Inventory Branch of the Supply Division conducts the internal audit of Supply Division procedures. It reviews regulations, instructions and responsibilities of the various units of the Supply Division. It is responsible for identifying problem areas by personal interview methods and preparing Supply Division instructions to correct procedures. In this function, the Inspection and Inventory Branch acts in a staff capacity responsible directly to the Chief of the Office of Logistics.

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C. Equipment

The following list is of the equipment leased by the Automatic Data Processing Division. The electronic data processing equipment is located in Central Building and the electric accounting machine equipment is located in Curie Hall. Figures 38 and 39 show the EDP equipment in Rooms 1 and 2 of Central Building. It is planned to move the EAM equipment to the Administration Building within the near future.

ELECTRONIC DATA PROCESSING MACHINES  
(RCA)

| <u>Model No.</u> | <u>Description</u>                          | <u>Quantity</u> |
|------------------|---|-----------------|
| 503              | Computer                                    | 1               |
| 561-2            | Hi Speed Storage (32, 768) Memory Locations | 1               |
| 581              | Tape Station                                | 8               |
| 535              | Electro Mechanical Printer                  | 1               |
| 527              | Card Punch                                  | 1               |
| 538              | Card Punch                                  | 1               |
| 547-6            | Tape Switching Unit                         | 1               |
| 525              | Tapewriter Verifier                         | 3               |

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## ELECTRIC ACCOUNTING MACHINES

(IBM)

| <u>Model No.</u> | <u>Description</u>          | <u>Quantity</u> |
|------------------|-----------------------------|-----------------|
| 024              | Alphabetical Punch          | 12              |
| 026              | Alphabetical Printing Punch | 1               |
| 056              | Alphabetical Verifier       | 8               |
| 087              | Collator                    | 1               |
| 085              | Collator                    | 5               |
| 089              | Collator (Alphabetical)     | 1               |
| 083              | Sorter                      | 4               |
| 514              | Reproducing Punch           | 4               |
| 552              | Interpreter                 | 1               |
| 556              | Interpreter                 | 1               |
| 407              | Accounting Machine          | 3               |
| 408              | Accounting Machine          | 2               |
| 416              | Accounting Machine          | 1               |

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VII

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## VII. MODEL SYSTEM

### A. Management's Role

Management is the art and science of planning, organizing, and controlling human effort to achieve useful ends. Management proper is a function concerned with the execution of policy within the limits set up by administration, and the employment of the organization for the particular objects set before it. Organization is defined as the division of work to be done into separate tasks and the assignment of these tasks to individuals qualified by training and natural characteristics for their efficient accomplishment.

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## B. Functional Groups

### 1. Description

An organization of the governmental support type may be divided into three principal functional groups: Financial, Personnel, and Supply. There is, in addition, a fourth group, Support Services, that performs those functions which are not assignable to the three principal groups. These four groups are shown in Figure 40.

The Financial Group provides the basic functions of accounting, auditing, budgeting, contracts administration, and disbursing. These functions are divided into additional categories in the cases of accounting and auditing. The individual functions in the Financial Group, as well as in the other groups, are defined in the next section.

The Personnel Group performs those functions which concern the relationship between the employees and the organization.

The Supply Group provides functions that relate mainly to the acquisition, storage, movement, and control of materials, supplies, and equipment.

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The Support Services Group provides functions of a staff nature and also those functions that relate to the three principal functional groups.

A fifth group, Data Processing, furnishes data processing services to the three principal functional groups: Financial, Personnel, and Supply. Owing to the need for providing relatively comparable services to these three groups, it is essential that they be separated organizationally from the Data Processing Group.

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## 2. Definitions

The various functions that are generally performed in a model governmental support organization have been defined in the following list.

### a. Financial Functions

Accounts Payable--The recording of liabilities created through the purchase of equipment, materials supplies, and services received on account; the setting up of the proper charge upon receipt of the goods or services; and the verification of the corresponding invoice.

Accounts Receivable--The recording of assets created through claims arising from delivery of goods or rendering of services.

Auditing--The examination of accounting records to verify their accuracy and conformity with accounting practices and policy; the reporting of the findings of that examination to management together with recommendations for corrective action on disclosed deficiencies.

Budgeting--The assembling of a comprehensive financial statement which includes the anticipated revenue and the estimated amount of expenditures

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required to conduct the various activities and functions of the company or agency for a specified period of time or a specific project.

Contracts Administration--The supervision of agreements made by the company or agency with outside contractors to insure that the terms of the agreement are satisfied; that the contractor adheres to established cost principles in performance of the contract; and that property resulting from, and/or furnished as a result of, the agreement is properly protected and accounted for.

Cost Accounting--The assembling and recording of all elements of costs incurred to accomplish a purpose, to carry on an activity or operation, or to complete a unit of work or a specific job.

Disbursing--The preparation of payroll and accounts payable checks, the safeguarding of funds.

External Auditing--The auditing of the accounts of a particular group (e.g., Financial) by personnel belonging to another group (e.g., Personnel).

G. A. O. Auditing--The auditing of a company or agency by the General Accounting Office through the use of either: (1) a comprehensive audit, which

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involves an analytical and critical examination of a company or agency and its activities, or (2) an other-site audit, which involves an examination of the accounts and records of a company or agency at the place or places where those accounts and records are normally kept.

General Accounting--The assembling and recording of transactions that pertain to such matters as cash, investments, appropriations, and funds, which are not handled by the other functional financial groups; the co-ordination and assembling of all accounting data for incorporation into the company's or agency's financial statements; and the overall direction of the financial functions with respect to accounting policy, uniformity of practices and methods, and relations with other groups.

Internal Auditing--The auditing of accounts of a particular group (e.g., Financial) by personnel belonging to that group.

Material Accounting--The determination and recording of the monetary value of such items as materials, goods, and supplies that are contained in inventory.

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Property Accounting--The assembling and recording of the monetary transactions which concern land, buildings, equipment, furniture, vehicles and like items; the maintaining of records covering the acquisition, depreciation, transfer, maintenance expenses, and retirement of this property.

Special Payroll--The keeping of records which list the salaries or wages due personnel that are employed under non-standard conditions, with location and pay periods subject to irregularity, and the deductions chargeable against those salaries or wages.

Standard Payroll--The keeping of records which list the salaries or wages due personnel that are employed under standard conditions of regularity of pay period and working location and the deductions chargeable against those salaries or wages.

Technical Accounting--Specialized accounting that is a function of the particular company or agency involved.

b. Personnel Functions

Career Services--The assembling and recording of the qualifications of employees for various types of

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activities and the choice of the best qualified among the employees available for a specific activity or activities.

Employee Awards--The assembling and recording of data on the suggestions of employees, the patents pending or granted to employees, and meritorious service of employees.

Personnel Administration--The general supervision and planning of all personnel functions, the formulation of employee policies, the conducting or supervision of exit interviews, the provision of employee services and communications, the conducting of employee-relations research, and the supervision of the retirement plan.

Health and Safety--The assembling, analysis, and recording of data on employee accidents and illnesses, the providing of personal protective devices, the development and maintenance of safeguards for all machinery and equipment, and the supervision of a health and safety program.

Job Evaluation--The accurate description of jobs, the analysis and weighing of the factors required to perform the jobs satisfactorily, the conducting of wage

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and salary surveys, and the assembling and recording of this information.

Leave--The collection and recording of information regarding annual, sick, and home leave of employees.

Manpower Estimates--The determination of the total number of personnel for each of the various job descriptions that will be required to accomplish the assigned work task during a specified future time period.

Merit Rating--The evaluation and recording of the effort and performance of each individual employee on his job; the analysis of this information.

Personnel Records--The maintenance of records pertaining to such matters as pay rate and occupation changes, promotions or demotions, transfers, termination, deductions from pay, leave, health, accidents, and absences for present and former employees; also, the maintenance of records concerning applicants and the retirement plan.

Recruiting--The contacting of prospective employees by various means for the purpose of

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providing a supply of applicants from which employees may be selected.

Security--The safeguarding of classified information to prevent its acquisition by unauthorized personnel, the processing of employee clearances, and the supervision of the destruction of all obsolete classified documents and all other classified waste material.

Selection and Placement--The interviewing and screening of applicants for job openings, the selection of the best qualified applicants for those openings, and the assembling and recording of information concerning these matters.

Training--The offering of in-company classes for employees, the supervision of apprentices, the maintaining of liaison with local universities and schools that provide advanced courses and cultural courses, the advising on courses and help in registration for courses, and the keeping of records on employee progress in courses.

Transfers--The changing of job status and/or location for employees, and the assembling and recording of information regarding such changes.

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Travel--The gathering of information on transportation to, and housing in, travel areas of interest; the arranging of business trips for employees; and the obtaining of transportation to, and housing accommodations in, specific locations.

c. Supply Functions

Cataloging--The collecting and filing of catalogs and other product and vendor information to enable later retrieval when required by using personnel.

Inspection--The visual examination of materials and equipment to insure their adequacy or quality with respect to specifications or other descriptive literature and the recording of the results of those examinations.

Inventory Control--The preparing, communicating, accumulating, and summarizing of information concerning a large number of daily occurrences affecting actual and planned inventory balances; the maintaining of quantitative, descriptive, and procurement data regarding each inventory item; and the manipulating, correlating, and review of the above information as the basis for making inventory decisions and taking the required action; the handling and storage of supplies, materials, and equipment in stock.

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Packing--The preparation of materials and equipment for shipment, the use of protective methods for insuring safe delivery of the materials and equipment, and the repackaging of materials and equipment when required.

Product Testing--The testing of materials and equipment to insure their adequacy or quality with respect to specifications or other descriptive literature and the recording of the results of the tests.

Purchasing--The translation of purchase requisitions into purchase orders by the process of endeavoring to obtain the specified items, of suitable quality, on or before their required delivery date at the best possible price; the submission of requests for price quotations to several vendors in the case of competitive items, the supplying of aid in the selection of the vendor in this case, and finally the authorization of purchase.

Quality Control--The determination of the standards by which materials and equipment should be tested and evaluated; the development, selection, and distribution of statistical methods for insuring that

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the quality of the materials and equipment being tested is adequate.

Receiving--The receipt of incoming materials and equipment, the checking of quantities received with respect to quantities ordered, and the recording of appropriate specified data concerning incoming materials and equipment.

Shipping--The gathering of information regarding available transportation services, the location and obtaining of transportation when and as necessary to permit the movement of materials and equipment to desired destinations, and the keeping of records pertaining to such movement of materials and equipment.

Space Utilization--The planning for the total future required work area and the optimum division of that total area into individual work spaces.

Technical Support--The provision of specialized engineering guidance and assistance as required, the repair and preventive maintenance of all technical equipment.

Transportation--The provision and maintenance of an operating supply of vehicles, and the scheduling

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of the efficient usage of these vehicles.

Vendor Qualification--The determination of the financial, technical, and production aspects of a vendor's ability to deliver a product of required quality by a required date.

d. Support Services Functions

Communications--The providing of all necessary types of communications services as required for the efficient performance of the company's tasks, the maintenance and up-dating of the inter-office telephone directory and other company communications directories, and the arranging for and coordinating of the maintenance of the company's communications equipment.

Grounds and Buildings--The maintaining of grounds and buildings in optimum condition, the alteration of grounds and buildings as required, and the arranging for and supervising of all maintenance and alterations that are performed by outside vendors on the company's grounds and buildings.

Legal--The review and analysis, and the approval of the form, of all legal documents which concern the company, the providing of assistance to the Contracts

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Administration Group in the preparation of contracts with vendors, the handling of legal matters concerning the company's operation with other parties, and the establishment of policies and procedures that insure that expenditures of funds are legally correct.

Mail Room--The receipt and distribution of all incoming mail, the preparation and dispatch of all outgoing mail, and the delivery of inter-office mail, all of the above in accordance with security procedures where applicable.

Maintenance--The repair and preventive maintenance of all machinery, equipment (other than technical), and furniture; the recording of the maintenance history of all machinery and equipment; the acquisition and stocking of repair parts and materials; and the arrangement for and coordination of all repair and maintenance that is required to be performed by outside vendors.

Medical--The physical examination of potential new employees, the physical examination of employees working on hazardous occupations, the periodic examination of all employees, the operation and maintenance

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of all first aid facilities, and the provision of an advisory service to the Health and Safety Group.

Plant Security--The protection of company property from fire, theft, and damage; the prevention of unauthorized entry of persons to restricted company buildings and facilities.

Records Management--The provision and maintenance of a filing and storage system that safeguards all records against loss, fire, theft, or damage; the administration and supervision of the periodic disposal of all obsolete records.

Reproduction--The procurement, operation, and maintenance of all necessary reproducing and printing equipment; the provision of photographic services as required.

Technical--The providing of specialized technical advice, guidance, and assistance as required by other groups to enable these groups to properly perform their functions.

e. Data Processing Functions

Timekeeping--The distribution and collection of attendance cards (and labor cards, if used); the sense-marking of exceptions to regular attendance; and the

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sense-marking of time spent by employees on their various job numbers.

Programming--The preparation of programs as required for the timely and efficient production of output data by the electronic data processor.

Processor Operating Group--The operation of the electronic data processor; the printing and issuing of registers, records, reports, and pay checks; and the handling and protection of punched card and magnetic tape records.

Card Processing Group--The key punching and verifying of punched cards; the operation of all punched card machines exclusive of the electronic data processor.

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### C. Information Flow

If information is to be processed effectively and efficiently in any organization, it is necessary first to arrange for its proper flow. For each individual application, such as standard payroll or equipment purchases, this flow will occur both between groups and within groups. A separate flow chart should be prepared for each of these two cases. In addition to the flow charts, there should also be a written description of the information flow sequence. With this combined information it is possible to analyze the flow to determine if duplication of purpose, procedure, or forms exists and if improved or more appropriate equipment can be used to process the data.

Two applications, standard payroll and equipment purchases, have been analyzed in this report.

#### 1. Standard Payroll

The model information flow sequence for standard payroll is described in detail on the following pages. The model flow for standard payroll, Figure 41, shows the paths of information flow between groups. The model flow chart for standard payroll, Figure 42, indicates by solid line the flow of work within the Data Processing Group. The transfer of information is shown by dashed line.

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### MODEL INFORMATION FLOW SEQUENCE FOR STANDARD PAYROLL

1. The Card Processing Group receives data from Personnel Records and card punches (on a printing card punch) and verifies a master payroll card for each employee, listing all information that should appear on each of his daily attendance cards: department number, employee number, and name, and other data such as social security number, title, grade, withholding exemption, and pay rate, that is necessary in preparing the payroll and individual pay record cards.
2. The Card Processing Group card punches and verifies a spread deduction card for each employee, listing the employee number, name, and his various deductions.
3. The Card Processing Group sorts the master payroll cards, first, in order of department number and, second, in order of employee number.
4. The Processor Operating Group places the sorted master payroll cards in the card reader.
5. A master payroll tape is produced by the data processor.
6. The Card Processing Group sorts the spread deduction cards, first, in order of department number and, second, in order of employee number.

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7. The Processor Operating Group places the sorted spread deduction cards in the card reader.

8. A year-to-date and deductions tape is produced by the data processor. Sufficient space is reserved on the tape after each employee number to allow the inclusion of the employee's current earnings and year-to-date pay record.

9. The Card Processing Group prepunches the daily attendance cards with department number, employee number, and name, obtaining this data from the master payroll cards. A reproducing punch is used for this operation.

10. The Timekeeping Group distributes these attendance cards to card racks in the various areas.

11. The employee fills out his attendance card daily, listing total time, job numbers on which he works, and time spent on each job number. This data may be recorded on the card by means of a time clock if desired.

12. An alternative method is to separate the attendance data from the job number data by recording each set of this data on separate cards: attendance cards and labor cards.

13. Attendance cards (and labor cards, if used) are collected by the Timekeeping Group.

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14. The Timekeeping Group sense-marks on each attendance (or labor) card the job numbers, and the time spent on each of the job numbers. (This data is used for labor distribution but not for standard payroll.)

15. The sense-marked information is mark-sense punched into the cards by the Card Processing Group.

16. Department managers report to the Leave Group and the Timekeeping Group regarding the periods of annual leave, sick leave, and home leave of their employees.

17. The Timekeeping Group reviews all attendance cards for lateness, sickness, overtime, vacation, or leave.

18. Either when attendance cards alone are used or when both attendance and labor cards are used, the Timekeeping Group will sense-mark on the attendance cards any exceptions from regular attendance.

19. The sense-marked information is mark-sense punched into the exception attendance cards by the Card Processing Group.

20. The Transfers Group supplies the Standard Payroll Group with a copy of the payroll change slip for cases where the job status and/or location have changed for an employee.

21. The Personnel Administration Group supplies the Standard Payroll Group with a copy of the payroll change slip for all employee terminations.

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22. In all cases when payroll change slips are issued, the original is sent to the Standard Payroll Group, one copy is given to the employee with his pay check, one copy is sent to the Personnel Records Group for filing in the employee's personnel folder, and one copy is sent to the Disbursing Group. The Disbursing Group copy is required where a new location is involved for an employee, thus necessitating the preparation of a new addressograph plate.

23. The Standard Payroll Group reviews and authenticates the payroll change slip and sense-marks on a transfer-out finder card the employee number, his old and new job status and/or his old and new department (or location). (The finder card will locate on the magnetic tape the employee record that is to be changed and cause that complete employee record on tape to be punched into a card.)

24. In the case of terminations, the Standard Payroll Group reviews and authenticates the payroll change slip and sense-marks on a transfer-out finder card the employee number, his job status, his department and a termination coding.

25. The transfer-out finder card is mark-sense punched by the Card Processing Group.

26. The Job Evaluation Group supplies Personnel Administration with information regarding recommendations for pay rate changes that result from wage and salary surveys.

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27. Personnel Administration advises the Standard Payroll Group concerning blanket changes in pay rates that should occur as a result of legislation or surveys.

28. Employees are rated periodically on sense-marked merit-rating cards for effort and performance by their department managers.

29. The merit-rating cards are mark-sense punched by the Card Processing Group.

30. The Processor Operating Group places the cards in the card reader and the data processor prints monthly merit-rating reports for the Merit Rating Group.

31. The Merit Rating Group determines from the merit-rating report the various pay rate changes that should occur and prepares a payroll change slip for each change in pay rate for an employee.

32. The Merit Rating Group supplies the Standard Payroll Group with a copy of the payroll change slip for each pay rate change for an employee.

33. The Standard Payroll Group reviews and authenticates the payroll change slip and sense-marks on a pay-change finder card the employee number, the old pay rate, and the new pay rate.

34. The pay-change finder card is mark-sense punched by the Card Processing Group.

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35. Daily, the Card Processing Group sorts the labor cards (used for labor distribution), exception-attendance cards, transfer-out finder cards, and pay-change finder cards (and master payroll change cards from the previous day), first, in order of department number and, second, in order of employee number. Steps 36 through 43 are also performed daily.

36. The Processor Operating Group places the sorted cards in the card reader, the previous day's master payroll tape on one magnetic tape unit, and the tape to be used for the updated master payroll tape on a second magnetic tape unit.

37. The data processor will read the hourly rate from the master payroll tape and compute rate times hours for each labor card in the case of hourly employees.

38. The data processor will add the total daily hours and amount of pay to the accumulated hours and amount on the master payroll tape. The accumulated hours and amount records will change daily for each employee that has worked that day.

39. The data processor will recognize the finder cards and cause the complete employee record on tape to be punched into a master payroll change card.

40. The Card Processing Group sorts the master payroll change cards into their new sequence with the finder cards and

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exception-attendance cards. The change cards for terminated employees are sorted into a separate group and filed.

41. The Processor Operating Group places the sorted cards in the card reader.

42. The data processor will produce an updated master payroll tape.

43. The data processor will produce time and attendance reports for the various departments.

44. The Personnel Records Group alters its records for all changes in payroll deductions required by law or requested by employees. (These deductions will include retirement (or FICA), Federal income taxes, health benefits, group life insurance, state income taxes (where applicable), United States Savings Bonds, and other voluntary deductions.)

45. The Personnel Records Group sense-marks the changes in deductions on a deduction finder card.

46. The Card Processing Group mark-sense punches the deduction finder card.

47. Before the bi-weekly payroll processing is begun, the Card Processing Group sorts the transfer-out finder and deduction finder cards, first, in order of department and, second, in order of employee number. Steps 48 through 68 are also performed bi-weekly.

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48. The Processor Operating Group places the sorted finder cards in the card reader, the year-to-date and deductions tape on one magnetic tape unit, and the tape to be used for the updated year-to-date and deductions tape on a second magnetic tape unit.

49. The data processor will produce an updated year-to-date and deductions tape.

50. The data processor punches a transfer change card with current, or updated, deductions for all transfers out.

51. The data processor prints a report for the Standard Payroll Group which lists all changes in deductions for the bi-weekly period.

52. The Card Processing Group sorts the transfer change cards, first, in order of department number and, second, in order of employee number.

53. The Processor Operating Group places the sorted transfer change cards in the card reader.

54. The Processor Operating Group places the updated master payroll tape on one magnetic tape unit, the updated year-to-date and deductions tape on a second magnetic tape unit, and the tape to be used for the updated year-to-date and deductions tape on a third magnetic tape unit.

55. The data processor records, in proper sequence on the updated year-to-date and deductions tape, the transfer-in data contained on the transfer change cards.

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56. The data processor processes or computes the following:

- a. Accumulated gross pay from the master payroll tape.
- b. Retirement (or FICA) % of weekly gross = retirement (or FICA) deduction.
- c. Test total FICA amount deducted to date to insure that the amount has not exceeded the allowable.
- d.  $\left[ \text{Gross} - (\text{tax class} \times \$13.00) \right] \times 18\% = \text{withholding tax}.$
- e. Health benefits.
- f. Group life insurance.
- g. State income taxes--these will vary depending upon the state. The withholding formulas of the specific states involved should be used.
- h. United States Savings Bonds.
- i. Other voluntary deductions.
- j. Accumulated deductions.
- k.  $\text{Gross} - \left[ \text{FICA (or retirement)} + \text{withholding} + \text{health benefits} + \text{group life} + \text{state tax} + \text{bonds} + \text{other} \right] = \text{net current earnings}.$
- l.  $\text{Gross pay} + \text{gross to date} = \text{new gross year-to-date}.$
- m.  $\text{FICA} + \text{FICA year-to-date} = \text{new FICA year-to-date}.$
- n.  $\text{Withholding tax} + \text{withholding tax year-to-date} = \text{new withholding tax year-to-date}.$
- o.  $\text{State tax} + \text{state tax year-to-date} = \text{new state tax year-to-date}.$

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57. The data processor prints a payroll register in a format similar to SF 1013 (Payroll for Personal Services--Annual Salary Basis), or SF 1072 (Payroll for Personal Services--Various Salary Bases). If both classes of employees exist, a composite format should be used.

58. The data processor records on the updated year-to-date and deductions tape the current earnings and year-to-date information for all standard payroll employees.

59. The Processor Operating Group places the updated year-to-date and deductions tape on one magnetic tape unit and tape for recording a check reconciliation tape on a second magnetic tape unit.

60. The data processor prints the pay checks and earnings statements.

61. The data processor records a check reconciliation tape which contains the check number, employee number, and net amount of the check.

62. The Processor Operating Group uses this check reconciliation tape as an input to the data processor.

63. The data processor prints a check register for the Disbursing Group.

64. The Processor Operating Group uses the year-to-date and deductions tape as an input to the data processor.

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65. The data processor prints a deduction register for the Standard Payroll Group.

66. The Processor Operating Group forwards the completed pay checks to the Disbursing Group.

67. The Disbursing Group inserts the pay checks in envelopes by automatic means.

68. The Disbursing Group distributes the pay checks to the various departments.

69. The returned checks are received from the bank by the Disbursing Group.

70. The Disbursing Group forwards the returned checks to the Card Processing Group.

71. The Card Processing Group sorts the returned checks by check number.

72. The Processor Operating Group places the sorted returned checks in the card reader.

73. The Processor Operating Group places the checks-still-outstanding tape from the previous period on one magnetic tape unit and tape for recording the current period's checks-still-outstanding tape on a second magnetic tape unit.

74. After the checks-still-outstanding tape from the previous period has been run, the Processor Operating Group places the current period's check reconciliation tape on the first magnetic tape unit.

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75. The data processor accumulates the total amounts for returned and outstanding checks and prints this information as well as a listing of outstanding checks and amounts for the Disbursing Group.

76. The data processor records an updated checks-still-outstanding tape.

77. Individual pay cards, patterned after SF 1127, may be printed by the data processor whenever desired, but at least annually, by recording an individual-pay-record tape. This tape is recorded in order of employee number.

78. Since the master payroll tape and year-to-date and deductions tape are recorded, first, in order of department number and, second, in order of employee number, it is necessary for the Processor Operating Group to prepare the individual-pay-record tape prior to use. This is accomplished by recording a complete series of employee numbers on the individual-pay-record tape with sufficient space between the numbers to allow recording of the bi-weekly, quarterly, and annual earnings, deductions, and net pay for a calendar year. There must also be sufficient space between the numbers for recording bi-weekly change slip numbers, bond schedule numbers, bond purchases or refunds, and bond balance brought forward. There must also be space for including data on employee change of grade, with a listing of type of action, effective date, title, grade, and pay rate.

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79. The Processor Operating Group places the master payroll tape on one magnetic tape unit, the year-to-date and deductions tape on a second magnetic tape unit, and the prepared tape to be used for the individual-pay-record tape on a third magnetic tape unit.

80. The Processor Operating Group uses the master payroll tape and the year-to-date and deductions tape as inputs to the data processor, once for each department number. The individual-pay-record tape is updated for all employees in one department, then for all employees in the second department, and so forth until all departments and all employees have been included.

81. Whenever individual pay record cards are required, the Processor Operating Group uses the individual-pay-record tape as an input to the data processor.

82. The data processor prints individual pay record cards for the Standard Payroll Group.

83. Quarterly, the Processor Operating Group uses the individual-pay-record tape as an input to the data processor.

84. The data processor prints out, for the Standard Payroll Group, quarterly totals of Federal income and FICA taxes withheld from all employees, first, in order of department number and, second, in order of employee number.

85. Annually, the Processor Operating Group places the master payroll tape on one magnetic tape unit and the year-to-date and deductions tape on a second magnetic tape unit.

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86. The data processor prints W-2 forms for all employees.

87. The W-2 forms for all employees are addressed by use of an addressograph machine in the Mail Room (or in the Disbursing Group).

88. Alternatively, if it is desired to prepare W-2 forms in order of employee number rather than, first, in order of department number and, second, in order of employee number, the Processor Operating Group annually uses the individual-pay-record tape as an input to the data processor. This step is followed by steps 86 and 87.

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## 2. Equipment Purchases

A tentative model information flow sequence is presented on the next page. This sequence is mainly illustrative of the flow that occurs between the various groups. It is not detailed as in the case of Standard Payroll. The model flow for equipment purchases, Figure 43, shows the tentative paths of information flow between groups. A model flow chart similar to Figure 42 showing data processing operations has not been included in this status study.

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MODEL INFORMATION FLOW SEQUENCE  
FOR EQUIPMENT PURCHASES

1. The Technical Support Group obtains data from the Cataloging Group regarding possible equipment that may satisfy the requirements of the user group.
2. The Vendor Qualification Group advises the Technical Support Group on the potential vendors' qualifications.
3. The Technical Group in Support Services provides assistance if necessary.
4. After selection of the vendor, the Technical Support Group forwards a purchase requisition to the Purchasing Group.
5. Contracts Administration provides Purchasing with contracts assistance that may be required.
6. Purchasing sends the purchase order to Data Processing.
7. Purchasing sends a copy of the purchase order to the Receiving Group.
8. Data Processing sends a copy of the purchase order to the vendor. (As an alternate, Purchasing may send a copy of the purchase order to the vendor.)
9. The Receiving Group notifies Data Processing by a receiving report when the equipment is received.
10. The Inspection Group notifies Data Processing by an inspection report when the equipment has passed inspection. (The Technical Support Group and the Technical Group in Support Services may assist the

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Inspection Group in certain cases.)

11. Data Processing reports to Accounts Payable that payment is due the vendor.

12. After approval by Accounts Payable, Data Processing sends the vendor a check in payment for the equipment purchase.

13. Data Processing reports to the Inventory Control Group that the equipment has been added to inventory.

14. Data Processing reports the equipment acquisition to Property Accounting.

15. Data Processing reports to Cost Accounting on the cost of the equipment.

16. Data Processing reports to General Accounting regarding the purchase.

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3. Other

There are many model information flow sequences that should be prepared for use in system optimization.

These include the following among others:

- (1) Addition of new employees
- (2) Budgeting
- (3) Cost accounting
- (4) Equipment shipments to branches
- (5) Purchasing of supplies
- (6) Inventory control
- (7) Labor distribution
- (8) Leave
- (9) Special payroll
- (10) Location change for employees
- (11) Preparation of financial reports
- (12) Preparation of personnel reports
- (13) Preparation of supply reports

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D. Development of a Computer-Based Data Processing System

1. Introduction

A data processing system developed and operated by means of manual or conventional accounting machine methods lacks three important qualities found in the more advanced computer-based data processing systems. They are:

1. The information is not sufficiently timely to meet the requirements for all management decisions and sometimes is not selective enough to focus attention on situations requiring immediate attention.
2. The conventional data processing system is periodic in nature while the operations of an organization are not.
3. The informational reports are organized in such a manner that the inter-relationship between functions are not readily apparent.

There are three possible justifications for using a computer in the management field aside from the obvious applications in the design and engineering fields. They are:

1. To cut clerical costs.
2. To produce faster and better management control information than is practicable by alternate methods.

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3. To facilitate the application of mathematical techniques to the solution of management problems.

To cut clerical costs, we look to changing the nature of the work we now require from clerks who handle data. Much of the present clerical effort is directed toward the endless repetitive tedious monotonies of sorting, filing, collating, copying, and matching. A computer can equal the efforts of many clerks in the performance of operations of this type. The systems designer who takes the approach that he can simply replace manual or conventional machine accounting methods with the computer soon finds that he has created many more problems than he has solved by speeding up an isolated processing area.

Manual and machine accounting methods are characterized by multiple files and batch operations. Basically, in a manual system we find many processing operations proceeding independently of one another, whereas in the computer the processing cycle is sequential. That is to say, the computer undertakes every possible operation on a given piece of data before going on to the next. Therefore, the processing cycle is necessarily orientated by type of input document rather than by type of report or operation.

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This means that the input must arrive at the computer on a scheduled basis in order that the desired output in the form of reports is both correct and timely.

The key to the solution of this problem, which is somewhat new to the machine accounting analyst in both scope and magnitude, lies in the systems approach to setting up a computer. The systems approach results in subjecting the entire data processing operation of an organization to a critical re-examination in order to determine the requirements of its information system. During the study the purpose of each of the present reports is examined and questioned. The reports are looked upon as a continuous flow of information required to carry on the objectives of the organization.

During the systems study, the analyst should be aware that the informational needs of the organization are not necessarily the output of present procedures. Current methods are often a patchwork imposed by present machine limitations, supervisory inflexibility, and reaction to past emergencies. As a consequence, the information for policy guidance and control of day-to-day operation may not be clearly reflected by current office activity. Reports are meant to convey information and information is meant to cause action.

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A prime consideration in designing the system is to determine a method of checking input data to preclude the introduction of erroneous data. In a manual system, the input data is characteristically re-checked at each level of summarization. In a computer system, the data, once accepted, tends to flow into the various reports without question as to its validity. As a result, the analyst often finds that erroneous data has entered so many reports that it is difficult to devise correction procedures which are easily handled by the present clerical force and consequently his system is subject to criticism and correctly so. Successful computer systems overcome this obstacle by placing a great deal of emphasis on the possible types of input errors and devise techniques within the computer program to detect suspect data and reject it at an early point of the processing cycle. The rejected data is then immediately returned to the originating department for correction. This feedback of erroneous information then tends to strengthen the data processing cycle rather than weaken it, as do so many elaborate error-correction techniques which require the attention of a computer specialist with a thorough knowledge of the program.

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## 2. Systems Study

Having decided that the systems approach to installing a computer-based data processing system is the preferred method, the first step is to gather data concerning the present system. Data is gathered in order to discover the fundamental requirements of the organization before describing the step-by-step data collection and processing operations for the computer programmer. One criterion most helpful during this initial phase of the study is to keep in mind that information is the basis for making management decisions and also it should reflect the result of the decision-making process. That is to say, it should convey information regarding what should be done as well as report on the effectiveness of previous decisions.

As the analyst tours the organization to gather information concerning the nature and volume of all transactions, records, and reports, it is imperative that his investigation be systematic and thorough. It is recommended that he have an organization chart so that he may check authority and functions in each department to insure that all the informational needs of the area are determined. As he collects copies of all forms, records, and reports, he notes on each where he got it. In each area, the personnel are questioned

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concerning the decisions which they make during the preparation of the input documents and, specifically, the manner in which all the data on the source document is obtained. The records collected should be filled out with actual representative data since blank forms often convey misleading information to the analyst. If the analyst has limited his questions to the work actually done in each specific area where the information was obtained, the data should be reasonably correct. With this data he can now return to his desk and flow the basic information required to conduct the organization's work in order to plan the computer programs.

The analyst will now investigate methods to simplify the flow of the documents and, in many cases, by-pass areas previously receiving copies of source documents and replace them with reports which will report on an exception basis the item requiring attention and action. Much of the apparent duplication of effort found in manual systems has arisen due to the fact that manual systems, in essence, operate in the simultaneous mode in order to obtain timely information. In a computer-based system, however, the information will be processed in a sequential mode and be timely as well, due to the computer's great processing speed.

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The most challenging problem facing the systems designer is to determine how to provide input data to the computer so that output data in the form of reports will be available at the proper time. A common method of scheduling the production and delivery of reports is to determine what action is taken as a result of a report and then determining the priority that this action has in the operation of the organization rather than asking each report recipient when he needs the report.

### 3. Systems Design

Having determined the informational needs of the organization and established an order of priority based on the relative importance of management action, the analyst organizes the data into computer tape files. The files are organized based on data usage and content. Basic record files contain master information, usually updated only when a basic record bit of information changes. Other files are working files and contain current updated transactions. At each succeeding level of summarization the information becomes more condensed. It is usually very important not to build into the system the requirement that all or any input errors be rectified before further processing of non-error items proceed. At each processing step, there



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must be an input which is either new data or the output from a previous step. Those outputs from previous steps determine the processing sequence to that point. When this causes problems in timing of output reports, alternative methods of gathering the required input must be sought or, perhaps, duplicate processing of the original inputs may be considered. Each "test" situation where a computer decision determines the next course of action can have only one of two possible solutions. If this is not so, then the information available to the computer has not been sufficiently detailed to program the report. All input data, of course, must result in an output of either intermediate or final reports or the input data has no place in the information system.

The real need in the reports area is not to superimpose a great many more reports on the existing information structure. Rather, the need is to think critically and determine what information is really needed or can profitably be used for planning and controlling the organization.

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### VIII. NEED FOR SYSTEM INDOCTRINATION

This status study has pointed out the fact that there is a great need for overall system indoctrination within the Agency. It is true that some training courses were presented by RCA in the computer field; but they were very inadequate. RCA is one of the younger companies in commercial computers and cannot be thought of as one of the more capable when it comes to back-up material for their computers. The courses that they gave were brief (a day or two at the most, in general). There was a large task to be accomplished because the Agency was just starting in the field of electronic data processing. For the main part, the courses that were given were presented to the wrong audiences. For instance, management people received the detailed programming courses and technical people, the executive courses. Be that as it may, these courses never were sufficient to convey the desired knowledge to the employees of the Agency. It is essential that proper training be accomplished, however, in order that this multi-million dollar system composed of equipment and methods can be properly implemented. Indoctrination, however, is not an easy task when one considers the involvement. The knowledge to be imparted is not only for present operations but also for future needs and must cover machine systems ranging from simple input devices, such as, the typewriter, through the high-speed computer now in use.

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#### A. Training Courses

The courses recommended would be of two types: general and specific. The general course would consist mainly of material on computers and the application of computers to business systems. Even at this stage of man's acceptance of computers, it is not easy to find a good general course that can be presented in a matter of a week or two to people who are not completely oriented to receive it. However, there are already many firms who do offer courses to their employees and most of the computer manufacturers do have general courses. In addition, there are books and certain college courses which can be used as back-up. The Agency will be using computers as far in the future as we can see. It will have to keep up with the general trend toward automatic data processing and there is no doubt that the ensuing years will find more computer usage, not only by the people presently involved but by everyone.

It has been mentioned, there are courses that are already being given in general business and scientific fields. However, it must be pointed out very strongly that the work of the Agency in many cases is unique among Government and industry. Any course given must not only be general in order to teach the basic underlying principles but must also go into the very specific needs of the Agency. For instance, in the payroll area, the Agency

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has several payrolls whereas most businesses have only one. Any general computer course will usually base its payroll discussions on the single payroll concept. However, that would not satisfy the indoctrination requirements of Agency personnel. Any specific course would probably be based on a general one. It is essential that this fact be borne in mind, so that at the end of the many weeks spent in indoctrination one does not find that the personnel, although they know a general system, are unable to cope with the specific problems of the Agency.

#### B. Limitations

The concept of limitations is one aspect of computer systems that one does not often find in general courses, especially the courses given by computer manufacturers. As a result of this study, however, it has become apparent that this important area should be presented to Agency personnel. Many of them are aware of computer capabilities from collateral reading and they know that an electronic data processor is nothing more than a tool; however, as a result of lack of indoctrination, the limitations of this tool are not fully understood. Most of the personnel think it will do more than it actually will. The RCA 501 Computer, however is limited and is on the low end of a medium-sized and -priced computer. It will not do all of the wonderful things that one reads about in various publications because it is not a

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large-scale, expensive computer containing the most modern and up-to-date advancements. Agency needs do not call for that type of computer. They do call for a typical business computer, which this is. A typical business computer, however, does not have the capabilities of the scientific types that we hear about with large, fast memories with instant access to millions and millions of bits of data. The 501 is relatively small. Its use must be carefully planned. It can handle only one problem at a time. Since there are four major jobs on this computer at present, it is necessary that they be handled in definite scheduled order. Although a computer will handle many problems, it can only handle them in the order in which they are programmed. There are many ramifications of computer limitations and it was not the intention of this status study to go into them. However, the necessity of pointing them out, so that personnel will utilize the computer accordingly, is established. Much of the dissatisfaction involving this computer will be alleviated when users become aware of the systematic cooperation that is essential in its operation.

The cooperation of the employees is an important aid to the success of an electronic data processing program for reasons such as the following:

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- (1) The development of an electronic data processing program is a large project involving the efforts of numerous individuals, most of whom are not under the direct supervision of the head of the program.
- (2) The computer program usually cuts across departmental lines and requires inter-departmental cooperation.
- (3) The development of a sound program often requires full and ready access to the records of other departments and an understanding of their system procedures.
- (4) The success of new systems and procedures depends on the desire of employees to see that they work properly.
- (5) Willingness of employees to transfer to the electronic data processing organization depends on their enthusiasm and interest in their new venture. The same can be said for their willingness to cooperate with that organization.
- (6) The Agency is greatly compartmentalized and there are many misunderstandings which arise because of the fact that communications are limited. Therefore,

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it is necessary for employees in an establishment of this type to make an effort to maintain cooperative links of communication.

It is essential that all employees be apprised of the system because, by definition, the system involves all of the employees. It is something that need not be gone into in great detail except as each individual part of it affects each individual's job. However, it has been found that people of reasonable intelligence function best when they are aware of what they are doing, what is expected of them, and what their contributions will add to the success of the overall effort. The Agency has people of better than average intelligence. This type of individual is not satisfied with routine jobs and the piecework approach to operations. This type of individual is a professional and once he is apprised of the relationship of his position with the rest of the organization, he works more efficiently toward the common goal. Because of this inherent intelligence, it can be stated optimistically that proper systems indoctrination and training will result in cooperation in the majority of cases.

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IX

## IX.. EVALUATION OF EDP SYSTEM

### A. Performance and Progress with Present EDP System

The present EDP system has been under lease and in the Central Building for over a year, since October 1960. The major processing equipment of the computer has always operated satisfactorily. This includes all of the equipment in Room 1. See Figure 38. Some of the units in Room 2, shown in Figure 39, including the card punch, card transcriber, and printer, have not been operating satisfactorily. This matter is discussed in more detail under section IX.E. The performance of the system as a whole leaves much to be desired, and it can be traced to the fact that an orderly system was not set up to utilize the new concept of electronic data processing. The progress toward the use of the computer has been excellent. However, the time has come when it is necessary to do an overall system study in order to get proper performance. Although progress has been good, it does not mean that performance is good.

It has been the observation of this study that the computer operators have been working practically beyond the limits of human endurance. They have learned how to be computer people. Most of this was done on their own as there was very little support actually given by the computer manufacturer or by any Government agency. None of these people were detached to attend school and

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most of them came directly out of the Electric Accounting Machine Division. Although, of course, there is some similarity between the tabulation equipment found in electric accounting machine systems and the electronic operation of a computer, it is really very superficial. It is a very difficult job to learn about computers and to train oneself at the same time so that he can operate a computer effectively. This has been done. The personnel now operating the computer have been doing very good work. The decision was made to allow them to take the time to learn and become programmers. This is what they now are. They know the RCA computer probably as well as most RCA employees. By no stretch of the imagination can they be considered to be well versed in the computer field, but they do know this one computer. Their progress has consisted of taking what systems knowledge they had and applying it to electronic data processing. One major reason that this report does not suggest the substitution of a new computer at this time is the fact that these operating personnel are very well versed in the RCA 501 computer and would have to be trained to handle another one. Although they are much more receptive to this training, because of their past work, it is not felt that it would be a good idea to make a change in the computer at this time unless further studies indicate that the present one is inadequate.

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There are many problems resulting from the performance of the present EDP system. One of these is the fact that the machine is saturated. There has never been a time that the facility did not run over the 176 hours primary shift (primary shift on the new contract is now 200 hours). In addition, it has been running considerably more than the present 200 hours. Compensated and uncompensated overtime is the usual order of the day in the computer area. The computer operators have been working nights trying to keep up with the work. It is true that the machine is saturated and that it cannot do the entire necessary job within eight hours. This is not to indicate that the present machine is too small or that it will be necessary always to be on overtime schedules. This statement can be made because of the fact that an orderly system does not exist to back-up the computer. Once an orderly system--Agency-wide--is completed, it will either be possible to operate the computer in a single shift, as was anticipated, or the need for a larger or faster computer will be indicated.

Users are not receiving their computer output when they want it. It is true that a payroll has never been missed but there have been many close calls. In the other areas of Personnel, Logistics, and Accounting, there has always been a great amount of dissatisfaction because reports are not forthcoming as they

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should be. It must be pointed out here that this is not a computer equipment problem alone. It is a systems problem if the input does not come in at the proper time, or in the proper form, or go to the proper place. It is then impossible for the computer to comply with the demands that output be delivered at a certain time and in a certain form.

The peripheral equipment failures, that is, the failure in the high-speed printer, the card punch, and the card reader have definitely acted to the detriment of the system. It is impossible to perform and fulfill management's role of input-output and production of reports without the 100% use of these devices.

In the first year of the computer's operation, it was necessary to spend much time in order to produce computer routines and programs. The decision had been made to bring electric accounting people up to electronic data processing jobs. Much valuable time was lost while these people were trained to be programmers, and during the first six months of operations certain chaotic conditions existed. This was due to the fact that some of the people who had formerly been in charge of electric accounting machine operations had now left that job and were programming for the data processor. During this period, the data processor was not working to full efficiency (because the programs were

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not completed) and the electric accounting machine function was not efficient because of the fact that many of the people had left.

During this first year it was necessary to spend much time with RCA at their plant in Cherry Hill, N. J. and also at the RCA Service Bureau in Washington. Much money was spent there on the Service Bureau's machine in order to debug and test programs. Because of these problems, and the fact that the operation was more or less pulling itself up by its own bootstraps, it was definitely slow getting started. The performance has been surprisingly good and the system involving the computer equipment is operating. There are many areas for improvement. One of them would be to evolve an orderly system based on the computer. Another necessity involves the computer equipment itself.

In general, users' reactions to the computer services have not been what was expected, and numerous problems have resulted from the fact that many of the users are not satisfied.

It was not the purpose of this report to list all of the problems that have to do with the electronic data processing system. In order to present a status report of this type, it is desired to list only a few of the more outstanding problems.

These are:

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## 1. Logistics Stock Status Book

This is a book that is printed every month on the high-speed printer. It contains every line item that is carried by the Agency. Approximately 66,000 items are carried in this book. Each book consists of 6,000 printed pages and nine copies are made each month. It takes approximately 33 hours to run these nine copies. The book is used in Logistics as a reference and also as an actual working document for stock additions and stock withdrawals. Whenever stock is obligated, the amount is entered into the book, adjacent to the item, by the stock analyst. At the same time, the stock analyst fills out a voucher which is sent to the Automatic Data Processing Division. This voucher is used to print the next book. In other words, at the end of the month, all of the vouchers are tabulated for each item and this gives the amount of withdrawals. The stock status book is also used for additions, and whenever stock arrives, it is added into the book by hand. At the same time, vouchers are sent to Automatic Data Processing, notifying them that additional stock has arrived. These vouchers are then used at the end of the month to up-date the stock status book to give the amount added. Several problems arise here.

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One is the fact that it is necessary to run nine copies of this book. It is usually run on five-part forms. Therefore, in order to run nine copies, it is necessary to print twice. Analysis may easily show that only five copies would be required rather than nine. If some of the receivers of this volume were to be apprised of the cost and the time involved to run the listing twice, they may very well realize that it is not necessary for them to receive a volume. The first step in any systems analysis is often to check the advisability of printing certain reports or of printing multiple copies of certain reports. Very often, a little ingenuity can be applied at this point to save time and money. If it is necessary for everyone to receive one of these reports, then the time and the money spent can be justified. If it is not necessary, this fact should be determined and steps taken accordingly. There has been quite a bit of discussion pointing toward the fact that stock status should be kept in a random-access type of computer so that in an instant the stock being withdrawn or being added to can be updated; and, also, similarly, within an instant, management can query the computer to find out what the exact amount of stock on hand is. This cannot be done with the present system without calling the stock analyst--asking him to



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check his books, add up all the withdrawals, add up all of the receivers, and come up with the actual amount on hand.

It is not an easy thing to specify a random-access device or a computer device to be used for Logistics without studying the situation. Such factors as the time involved, the people, and the location, must be considered. If a computer is needed for stock control, all well and good; but this problem must be very carefully investigated.

## 2. Cost Accounting versus Allotment Accounting

There has been a lot of dissatisfaction resulting from cost accounting by cost center numbers. Certain areas of the Agency would like to see listings, for instance, by cost center numbers, whereas others would like to see them listed by employee number and other categories. Taking a look at the payroll, there has been controversy as to whether the listings should be by employee cost center number, or whether the list should be by employee number, with the cost center number secondary. It is true that the computer can prepare both of these listings because each entry on the listing does contain both bits of information. However, it is a time consuming and expensive effort on the computer's part to sort and merge

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all of the information in order that a listing can be made from the information previously assembled in another order. It should be resolved as to whether or not this expense of time and money is justified. There has been certain dissatisfaction over the interpretation of Public Law 863 (see Appendix E). A lot of this is due to misunderstanding. Some areas of the Agency feel that compliance with a cost center number listing is absolutely necessary. Some feel that it is a General Accounting Office law and so forth. The major problem seems to be in a lack of understanding of what the law actually means. Actually, it must be applied only where it is feasible to apply it. Therefore, the Agency is not under obligation to follow cost centers in all cases. This fact should be pointed out to all employees and there should be a unified understanding. If then, it is true that different listings are necessary, one by cost center and one by employee number, for instance, this must be worked out, programmed, and scheduled accordingly.

### 3. Reports

There are a multitude of reports produced by the computer facility. The exact number is not known. The EAM system printed something like 10,000 reports a year and it is generally assumed that there are now more reports

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being issued. It has been very difficult to determine what all of the reports are. In this study, we have been unable to assemble a complete set of reports. This must be done as a part of a larger study. One thing has become apparent, and that is that many of the reports are redundant, that much of the information on one report is often repeated in another. Thus, these redundant reports can be consolidated. It has been observed that one report, with the addition of a column or two, could serve several areas very well, and thus free the computer from printing a complete new report. It has also been observed that the formats of the report are not consistent. For instance: employee number may appear as the first entry on one report and somewhere near the middle of another report. This makes it very difficult for employees to utilize these reports in an effective manner. They have to reorient themselves every time they look at a new report.

#### 4. Forms

It has been determined as a result of this study that there is no rigorous control of forms. It is true that all forms must be referred to the  of the Comptroller's Office, but the responsibility of this

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section is only to approve the report if it meets certain standards..

They have no authority to reject the form or suggest that the user utilize another form initiated by someone else. The results are obvious. There are now many forms, many hundreds in fact, being used throughout the Agency. These are not consistent. Many of these forms are the original entry documents for the computer. The information on them is punched into a paper tape or a punched card. Thus, the form should be laid out in such a manner that this work can be easily accomplished. At present, this is true in only a relatively small number of the forms. It is going to be necessary to examine all the forms on a uniform basis and thus eliminate the redundant ones, combine others, and in general make them more efficient.

#### 5. Entry of Data

One of the outstanding problems is the fact that entry is made by hand or by typewriter onto certain forms for input into the computer system. These forms are then prepared for the computer by additional operators who prepare a punched paper tape on a suitable machine or who punch IBM cards. The more accepted manner of doing this is to eliminate work and involvement by having the operators

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punch a paper tape at the time they make an entry onto the original form. This is being done only in the Office of Personnel and has proved satisfactory. The RCA 501 computer is uniquely suitable for receiving punched paper tapes from a flexowriter. Investigations should show that the time saved and personnel saved by making an original entry on a flexowriter would soon pay for the rental of this type of machine. In addition, the operator who makes the entry within the component is more likely to catch errors than would a machine operator who punches the paper tape from the form, at a later date and in another location.

#### 6. Posting

In certain areas of accounting, allotments and other postings are done by machine, but postings to the ledger are done by hand, whereas, in certain other areas, allotment posting is done by hand but posting to the ledger is done by the computer system. These are fertile fields for improvement because two different systems are running under one roof. Perhaps one is better than the other, but at least a suitable combination should be found that is most satisfactory. In DD/P, the work of the Budget and Finance Officers is all done by hand, and these once again are areas for

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extending the machine complex so that a certain amount of efficiency can exist between these areas and the computer system.

7. Da-Span

Another great problem revealed by this study has to do with the RCA Da-Span equipment. This is located partly at the warehouse and partly at the computer facility. This equipment is being rented for \$670 a month, has been on rental for over a year, and has never been operated. It can be pointed out as one of the typical problems of the Agency. For one thing, if it is not being used, the lease should be cancelled as it has been on the premises for over a year. Besides the actual expense there is an underlying adverse systems philosophy that this equipment points up. It is this. The machine was evidently leased by Logistics and it has been the impression of certain people in that office that it would operate directly into the computer. This is not true. Its mode of operation is as follows. The paper tape is punched at a remote site on a flexowriter typewriter. The paper tape is then placed into the transmitting end of the Da-Span and sent over commercial leased telephone wire to the receiving end where a paper tape is punched with the information. This paper tape can then be fed into the

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computer. The underlying factors are that the paper tape prepared in the warehouse must be compatible with a system already set up by the computer people. They must have a program so that they can handle the tape when it is received at the computer facility. However, in this case, there seemed to be no notification given to the computer people that the Da-Span system for transmission of information was to be used. No one asked their opinion about how the information should be sent, what the format was to be, what the transmission rates would be, and so forth. Thus, there has been no serious thought given to the overall systematic study of what this machine would do and how it would do it. A computer cannot be expected to take information suddenly sent to it from out of nowhere, process it, and return an answer. This is a typical problem where a lack of coordination between user and equipment operator exists. It can be cleared up by getting the various components together, discussing what is wanted, what is desirable, how equipment is going to be utilized, and what forms are necessary for information handling. The thought of using the Da-Span probably stems from a lack of understanding of computer operation. This is an obvious source of trouble in the overall

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system, because it is apparent that this equipment is not working and that it cannot work without further systems study.

#### 8. Error Rate

A large error rate is becoming normally acceptable in the Agency. By this, we are referring to errors on the input documents that are submitted to the computing facility. The rate is running about seven per cent. This is about two per cent clerical error and about five per cent inherent error. These errors are occurring in such things as cost center numbers, employee numbers, and other entries that should be carefully checked by the component originating the input document. What happens is that these must be corrected, either before they go into the computer or after they are processed. It involves careful checking by the people in the computer facility and also involves a great deal of corrective paperwork. There is no reason for this high percentage of error and it is running much above that in industry. In fact, things have become so bad that certain components are allowing these errors to go through without making an attempt to check them themselves because they know that the computer people will catch it. This is not the way to run an orderly system.



9. Late Time and Attendance Cards

There is a problem in late T and A cards.

Computer processing is often delayed until everyone's T and A card is in. This practice could possibly have been followed in EAM, where it is possible to process one card at a time, but it cannot be done with the computer, where everything must be done in order and entries are tied up on long magnetic tapes. When delaying this processing, a great deal of time is lost and the computer is kept from doing other essential work.

10. Exceptional-Information Reports

Another problem is that often the computer facility is expected to produce reports that are only looked at under exceptional conditions. The areas demanding these reports probably do not realize the cost and time involved in making these reports. If they did, they would realize that it would be better to find other ways of locating the exceptional pieces of information they desire.

11. Overtime

The overtime has gone up in the areas instead of down. For instance, in the Payroll Branch of the Fiscal Division, the overtime before installation of the electronic

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data processing equipment was 13-1/2 hours per pay period. Last year, with the EDP equipment, it was 260 hours per pay period. This year, it is 115 hours per pay period, so far, and the best estimate seems to be a future reduction to 80 hours a pay period. This is, of course, a situation that looks extremely bad on the surface. Investigation has revealed that this tremendous amount of overtime in that one branch can be reduced by efficient machine methods. There is much paperwork done in that area that could be avoided by the evolution of an overall efficient system.

## 12. Peculiar Problems

There are certain problems that are peculiar to an agency of this type. Many of these were never considered at the outset because the computer manufacturer, whose advice was taken, never understood the full ramifications of the Agency's business. This agency is unique among Government agencies in that there will always be many exceptions. The system is unique in the fact that there is so much printing. Yet, these matters were never taken into account when the computer was purchased. The choice of this computer was not an error, but the facts remain that it was never programmed for exceptions in the beginning and a systems study was never made.

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13. Summary

These typical problem areas have been chosen to represent the drawbacks to the performance and progress of this EDP system which have necessitated this status study. It has been pointed out in this section that there are problems and difficulties and that in the main they stem from the fact that the recommendations of the Management Staff, pointing up the need for an overall and complete systems study, were never implemented.

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## B. Operating Cost and Computer Operating Time

The present cost of the computer operation is \$700,000 per year. This includes the IBM electric accounting machine equipment, the RCA 501 Electronic Data Processor, personnel, supplies, and incidental items such as travel. The estimated cost for the calendar year of 1962 is \$866,577.

A reduction in costs of approximately \$50,000 will be achieved in the future when the electric accounting machine equipment is almost completely displaced. The equipment lease figures for FY 1962 are \$72,328 for EAM and \$264,300 for EDP, for a total of \$336,628 per year.

It is not likely that there will be any great reduction in the cost of this operation. It is apparent that the original concepts of saving money by the introduction of EDP to do the same jobs of EAM was not based on fact.

What is apparent is that the computer facility will always be of appreciable cost; but that it can be fully utilized to do much more than it now does. In this way, it will fully justify its existence.

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The operating time of the main electronic components has been excellent, whereas, all of the computer peripheral equipment (card reader, card punch, high-speed printer) have been unsatisfactory. In the past, it was necessary to skip normal preventive maintenance because of lack of time. Since the inception of this study, these procedures have been carried out. The results have been an improvement in the card reader and card punch operation. The printer, however, is still unable to turn out really acceptable work. The failure of this peripheral equipment is more fully discussed in section E which follows.

#### C. Progress Towards Original EDP Concept

The EDP concept, as understood by most people, is that laid down in the Management Staff reports. The concept was this--to convert from electric accounting machines to electronic data processing on a one-to-one basis. It was thought that this would save a certain number of people and save a certain amount of money.

In addition, it is generally thought that one of the original concepts, in October, 1960, was to do all processing being done by the electric accounting machines on the electronic data processor in four hours a day, the other four hours of the day could then be used to advantage for other computing needs of the Agency. Another

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concept was a phase-one, phase-two concept in which phase one would be the one-to-one change-over from EAM to EDP and phase two would be the optimization of all of the programs. This statement, about four hours, and also a clear definition of phase one and phase two activities were never seriously presented and, therefore, should be discounted. In the first place, it would have been very difficult to determine what the exact operating times of the computer would be when no detailed study had been done of programs necessary and so forth. Also, the phase-one, phase-two operation was never completely delineated. It is true that RCA insisted upon a one-to-one EAM conversion, but no program was ever laid out for this conversion and no program was ever laid out for a so-called phase-two operation involving optimization of programs and placing the rest of the manual system onto electronic data processing.

Therefore, the major concepts that are understood from the original recommendations are that there would be a saving both in personnel and in money. It is truly unfortunate that these were taken as concepts, because a system need not save money or people in order to be efficient. This Agency's work is vital, and must be done in a timely fashion regardless of cost and involvement of personnel. Many years ago when computers were brand

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new, they were sold on the strength of saving money and saving people. At that time, these were overriding considerations. However, as computers became more advanced, expensive, and complex, it was realized that they could very well justify their existence on other factors such as accuracy, speed, memory, compatibility, and suitability for the operation. Therefore, the fact that this machine has not saved money (in fact it is more expensive than the EAM equipment) and has not saved people is not a factor that can be seriously considered at this time. One must forget the desire to save people and money. The only true judge of a modern computer is: does it do the job in an efficient and satisfactory manner and is it worthwhile? Does it justify its keep? This computer is not operating in an orderly system at present. It is not operating in an optimized or idealized condition and it cannot be fully judged as to whether it earns its keep until an over-all system is evolved which is based upon the computer. Once this optimized system is delineated, it will be apparent whether a computer does justify itself. One of the basic underlying concepts of the original studies was that a detailed systems study was necessary and that detailed work would be necessary before the computer arrived. In addition, it stated that programming and all other systems work must be accomplished, either beforehand or as soon as possible. This concept was never followed, and the original

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plan for a systems study was never done. The team assembled to do the systems study in the Automatic Data Processing Division were also in charge of the programming. This became such an involved task, due to the fact that there was no experience and these people had to learn a new field, that it became impossible for them to do the systems study. Therefore, the progress toward the original concept has been negligible. There has been no saving in money, there has been no saving of people, there has been no saving in time of processing, and there has been no systems study.

#### D. Savings in Manpower, Time, and Equipment

The conversion from the electric accounting machine has never been completed due to the fact that the programming effort on the electronic data processing equipment was necessarily slow while the programmers were being trained. Most of the electric accounting machine equipment is still being retained and is still being used. Some areas that are already supposed to have been on the computer have not been able to go on because there has not been time to make the conversion. Notable among these is the unvouchered payroll which is completely on accounting machines. At the present rate, it will be impossible to place this on the computer and still operate the computer within the primary shift. Although several pieces of EAM equipment have been taken off the

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lease, there has been no great decrease in the amount of equipment being operated. As mentioned previously, there has been no saving in either time or people. The reason for this is that savings cannot be made and optimization cannot be done in a hit-and-miss fashion. They can only result from an overall conscientious effort to devise a completely integrated system in which there is a relation between all factors in such a manner as to provide for complete efficiency. Until this is done, there can be none of these savings. This efficiency has never been achieved and there have been no appreciable savings in equipment, in time, and in manpower.

#### E. Equipment

The equipment of the computer facility is shown in Figures 38 and 39. This equipment is located in Central Building and consists of the RCA 501 computer complex. Such basic data regarding the computer as its add time, access time, memory capacity, tape speeds, and so forth have not been included in this report although it has been taken into account in the study. The major reason for not including it here is the fact that it loses importance unless the exact method of utilization of these factors is known. This machine is relatively slow, having a cycle time of 15 microseconds. One cannot say that one of the newer machines with a cycle time of 6 or 7 microseconds is indicated and that if it were brought in it would be

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able to do the job twice as fast. These intimate machine details are only important as they relate to the system. It is possibly true that in the future, and if an orderly system is evolved, it will become apparent that a faster machine is necessary. However, at the present time, without this orderly system's backup, it is difficult to predict whether the present machine at its present speed will be able to serve a new system.

Due to the fact that this computer system has just been developing, the utilization times of the computer have not fully been established. Therefore, they have been varying from month to month. During the month of October, 1961, the utilized time was about 380 hours. This means that it was necessary to pay an hourly equipment rate for an extra 180 hours. That is the time over the basic 200 hours contract. In other months, the utilization has been only a few hours over 200. It is anticipated, with proper programming and scheduling of input and output, that it will be possible to complete all of the business processing of the Agency within the eight-hour shift. The overtime charges have run the cost of the computer installation into many thousands of dollars more than estimated. The estimate of computer cost given in the original Management Staff study involved a savings of \$29,000 in the MRD electric accounting machine costs. At that time, the EAM costs were approximately \$546,000 and, therefore, with a saving of \$29,000 the cost of this computer installation was anticipated to

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be in the order of \$537,000. Of course, this estimate was made in 1959 and costs would have gone up even if the electric accounting machine facility was retained. But these costs would never have approached the \$866,577 that has been budgeted for EDP operations in the calendar year 1962. The fact that this is more than \$300,000 higher than the EAM equipment costs must not be taken to mean that a computer cannot be used and should be eliminated. This increase can be traced directly back to the fact that there is no orderly system behind it. Once this is established, it will be seen that these costs reduce down to a normal level. It is true that they may never get down to the originally estimated \$29,000 savings, but an agency of this size and complexity cannot operate without a computer. Other Governmental components have been operating quite successfully and there is no reason why one cannot be optimistic in predicting that this agency can do the same thing.

It was anticipated that there would be a reduction of ninety per cent in the punched card operations after a year's operation of the EDP. This has not come about. One reason is that there have been additions to the electric accounting machine load ever since the computer arrived, and another reason is that the computer has not been ready and fully programmed to assume the complete EAM load. Several pieces of punched card equipment have gone off of lease, but not many. The original report said that there would be additional

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savings from systems redesign, and that this would come about as redesign was accomplished. However, as pointed out previously, redesign was never accomplished.

There have been failures and unsatisfactory performance within the equipment complex. One item of equipment in Room 2, the RCA high-speed printer, has never turned out satisfactory copies. One of the greatest problems existing in this system is due to that fact. The printer is of little value as far as quality output is concerned. For one thing, its rated speed is 600 lines per minute, but it has been almost impossible to obtain acceptable printing at that rate and, in many cases, runs at a slow speed setting of 350 lines per minute have been necessitated. Even then the printing is unacceptable. There are cases where characters are misplaced, where characters are jumped into the wrong line, and where printing occurs on top of other printing. Throughout the period of this study, everyone in the Agency has mentioned the bad printing that they receive. This cannot be tolerated because so much of the work utilizes printed reports from the computer. During this period, the computer manufacturer has made no serious effort to replace this printer with one of a better kind. The RCA 501 printer is one of the poorer ones on the market. However, there are ways that it possibly could have been made acceptable. Much of the dissatisfaction caused by the computer's operation is simply due to this one factor -- that of bad printing. Anyone who sees the printing is completely dissatisfied with it and it is very difficult for

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**SECRET***Printer!*  
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employees to work with this bad output. At the present time, this computer, from a status standpoint, can be assumed to be substantially below the level of acceptability; so, therefore, serious thought must be given to its replacement. In addition, other equipment, such as the card punch and the card reader, has not been operating satisfactorily. These three items of peripheral input-output were not built by RCA but were built by contract firms. In addition, RCA has had no previous experience in this type of equipment. It is strictly an electronic manufacturer. Due to all of these reasons, it has developed that this original equipment for the RCA 501 has been pretty well unacceptable to industry. In fact, as of the first of January of this year, RCA reduced the cost of this equipment on GSA lease to one-half its former price. Even at that rate it is unacceptable. The card punch and reader are used only 16 hours or so per month, yet they are on lease throughout the entire month. The cost of these units is \$1,174.00 a month for the card reader and \$876.00 a month for the card punch. This is considerable money to pay for only 16 hours of use throughout the month. These machines do specific jobs, and, if those jobs can be modified or changed so that the reader and the punch are not necessary, great savings can be effected. If it is necessary to use them to accomplish the present jobs, then more jobs should be placed on this leased equipment so that it will be economically justifiable.

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The present combined rental cost of the reader, punch, and printer is \$3,801.00 per month. Since the printer is unacceptable, the manufacturer has come up with an interim suggestion. That is, that a new system, involving what is known as a satellite computer, be leased. This small computer has a card punch, a card reader, and a printer. It is compatible with the present system and is known as the RCA 301. For an additional \$573.00 a month, or a total of \$4,374.00 a month, it is possible to lease this new equipment. The RCA 301 does have a satisfactory printer, reader, and punch.

Thus, it will be able to produce good results immediately upon arrival. By substituting equipment, it will be possible to eliminate the problems of bad printing. Since this problem extends to everyone in the Agency who is a user of these reports, this additional \$500.00 a month will be repaid in good will and in increased efficiency. The accompanying table shows a comparison of the cost between the present RCA 501 equipment and the new RCA 301 computer. Although cost is not an essential factor here, as stated before, it does enter into the determination. The main thing to bear in mind here is that the problems of the punch, reader, and printer can be reduced, with no need to make decisions involving hundreds of thousands of dollars. This RCA 301 equipment can be leased subject to cancellation and, if future system studies determine that some other course of action should be taken, it can then be returned.

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COMPARISON OF  
RCA PERIPHERAL EQUIPMENT

| 501                               |                | 301                        |                |
|-----------------------------------|----------------|----------------------------|----------------|
| Card Trans.<br>(527)              | \$1,174        | Adapter<br>(393-1)         | \$ 330         |
| Card Punch<br>(538)               | 876            | Adapter<br>(393-2)         | 381            |
| Printer<br>(535)                  | 1,751          | Processor<br>(303)         | 1,803          |
|                                   |                | Card Reader<br>(323)       |                |
|                                   |                | Card Control<br>(314-1)    | 495            |
|                                   |                | Card Punch<br>(334)        |                |
|                                   |                | Punch Control<br>(315)     | 489            |
|                                   |                | Printer<br>(333)           |                |
|                                   |                | Printer Control<br>(316-1) | 876            |
| Monthly Rental<br>(200 hours use) | <u>\$3,801</u> |                            | <u>\$4,374</u> |

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**SECRET****F. Workload****1. Present**

The present workload involves computer operations for the Logistics, Accounting, Payroll, Personnel, and Training components, and production and testing of programs. In addition, small amounts of work have been done for other areas such as the Automatic Data Processing Staff.

The only work that has been placed completely on the computer is that of the Office of Personnel. Certain areas of Logistics and Accounting have been partially placed on the computer. The vouchered payroll is completely on the computer. The unvouchered is not on. The idea of using random-access storage for Logistics has not been carried through. In fact, the original intent of RCA to provide random access for the 501 never materialized.

Programming and the debugging of programs has not been completed. In addition, the present status finds that there are many areas still on EAM and still in manual operation in which no consideration has been given as yet to placement on electronic data processing. The present workload therefore, does not include the full complete change-over from electric accounting machines. In addition, it does not include the follow-on program to bring the entire Agency's work on the computer.

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Even with this partial assumption of the Agency's entire work, the computer is saturated and is running more than the 200 hours primary shift. In some months, it has run as much as 180 hours beyond the primary shift. The present status means that with the work being done there is a tremendous involvement. Not only that, but in order to handle the presently accepted load there have been certain desired functions that have had to be put off until sometime in the future because of the saturated condition of the computer. One can say, now, that the present picture is not bright. This is certainly a true statement. The status of the computer operation at present, is one that must be corrected. There is more work to be done on the computer than it is now assuming. There are many manual methods that must go on electronic data processing, and even at this stage, with only a partial load, the computer is saturated. The programming staff has had to program over the past year for all of the work now being done, and they have been continually occupied with that task. The question as to whether the present workload can ever be effectively accomplished by this computer complex is one that cannot be solved by this study of short duration and was not within the scope of this study. In addition, much of the detailed information as to actual times have not been available because of certain security restrictions. It is felt in this

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status report that the present amount of work can be accomplished within a reasonable time. This is based on the fact that a lot of the debugging of programming has been accomplished in the last year, on the fact that efficient methods have not been used, and on the fact that the input forms and methods and the output reports and requirements bear very close scrutiny. These factors, when taken into account and combined in an effective manner, mean more efficient operation of the computer facilities from a time standpoint, resulting in the ability of the present staff and equipment to complete the desired work.

## 2. Future

Future workload of the Agency is generally conceded to be more or less stable as compared to today's workload. The workload within the computer facility will increase as more of what is now on EAM is passed on to EDP and as the Agency becomes a greater user of machine methods as contrasted to manual methods. An overall systems study must be done in order to determine what the future workload will be, since this has not been done in the past. There has been no projection of what the entire involvement was to be. There have only been vague verbal references to a phase two, which would involve putting the entire Agency's work on the computer. What is involved here has never really been determined. Therefore, the future course of action should be

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to use the present system to its fullest efficiency and optimize it as much as possible. At the same time, efforts should be directed toward completing an overall systems study which is projected at least five years into the future. This study is the only thing that can indicate whether the present computer facility will be able to operate in an efficient manner within the next few years. The course of action, to summarize, should then be to retain this computer, upon which employees have been trained, until definite deep consideration and deliberation would indicate that it may not be suitable in the future.

#### G. Scheduling Effectiveness

It has been difficult to assess the scheduling effectiveness of the computer because there has not been an orderly system to provide for feeding data into the computer or accepting its output. Scheduling, of course, must be done for a device of this type because every minute counts. In a saturated system such as this, minutes that are not utilized mean that someone's work is not going to be done.

In this present system, the major work has been accomplished throughout the day and far into the evening by much overtime work. Scheduling has been done and is continuing to be done, however, it is difficult to adhere to any schedule when the users of the computer information are not fully aware of how a computer facility operates. This is pointed out very clearly

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when many last minute demands are made upon the computer, when many exceptions are brought forth, and when information is not forthcoming for input. In these cases, it is necessary to shift the schedule. For this reason, this status study has determined that no assessment of scheduling activities would be significant at this time. Only when there is an orderly system evolved can it be determined how scheduling may be done effectively. At that time, an evaluation can be made as to whether these objectives are being met. The only thing that can be stated is the fact that with all of the difficulties that the Automatic Data Processing Division has faced from the outset, it is the opinion of this study that they have been doing an outstanding job in meeting the requirements placed upon them. They, of course, have not been complying with the needs of the Agency, but have been doing more than will be found in a cross section of computer activities in general. This is more than should be required of them at this point in the development of the system.

#### H. Users' Reaction to Computer Services

There has been much dissatisfaction throughout the Agency with the entire system. This study was performed within the DD/S and the dissatisfaction was found mainly in these areas. It is only by hearsay that we have been apprised of some of the thoughts throughout the rest of the Agency. The major drawback with the computer has been the fact that reports seem to be coming out slower, the people are unable to get certain reports that they want, certain reports are not in the form that is desired, and people

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are required to fill out certain input forms that they don't like. In addition, they feel that their systems are not as flexible as they were before and they also feel that they don't have the control that they had before.

Many of the users do not understand that a computer is a limited tool and, therefore, expect their work to be done instantaneously. Many of the people are not fully aware of the computer's limitations, and do not understand why information must be in a certain form in order to be acceptable as a computer input. There is a misunderstanding concerning the fact that a computer cannot make output suitable for each and every person's needs. Very few of the people within the Agency have training and background in computer-oriented systems, and most of the people seem to feel that something is wrong with the overall system. Some blame it on the computer, some blame it on the system, and some blame it on both. There definitely is misunderstanding between various areas. The Office of Logistics feels that they may be left out of full consideration and that the Comptroller's Office will get first use of the computer since the computer is in that office. On the other hand, the Office of Personnel which is also outside the Comptroller's Office has been receiving good service. The Office of Personnel, however, feels that they would like reports in different methods of arrangement. They also feel that they need additional reports, however, they do not realize that a computer can only run one report at a time and they often are upset because they

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cannot get their information exactly when they want it. There has been nothing observed by the members of this status team that would indicate that the users cannot be satisfied. There is no reason whatsoever why an orderly system cannot be evolved which will satisfy the majority of people. In addition, when there is a general understanding of what the computer system is all about and what the costs and involvements are in producing reports, changing forms, making exceptions, and so forth, they will be satisfied.

#### I. Summary

This status study has:

- (1) Evaluated development of the system to date
- (2) Ascertained the system's lack
- (3) Determined the misunderstanding resulting from the computer and electronic data processing system
- (4) Discussed the equipment problems
- (5) Demonstrated the need for management by exception, and exception reporting
- (6) Delineated large problem areas in flow of information, input forms, and output reports
- (7) Shown areas of inefficiency and error
- (8) Indicated a definite lack of communication
- (9) Indicated the great effort among employees

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- (10) Concluded that everyone wants a change now
- (11) Presented flow charts and details to indicate the present status and operation of this system

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**SECRET****X. RECOMMENDATIONS**

- A. First and foremost is the recommendation that an overall systems study be completed in order to permit development of an effective, orderly system.
- B. It is recommended that the detailed study be made by a competent team formed of members who know the intimate work of the Agency and also of members who are aware and conversant with systems of this type.
- C. Complete flow charting of the entire system should be accomplished.
- D. Portions of this system that are suited for electronic data processing should be placed upon a computer.
- E. It should be determined if the present computer is suitable and whether it should be retained.
- F. The need for additional or replacement computers should be determined.
- G. New peripheral equipment should be obtained as soon as possible to alleviate the difficulties presently encountered in printing reports and in punching and reading cards. It is further recommended that all forms and reports be studied to see whether they can be streamlined, optimized, and reduced in number.
- H. Unnecessary equipment, such as the Da-Span, should be taken off of lease.

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I. A systems indoctrination for personnel should be initiated and directed toward the specific needs of the Agency.

J. The entire concept of data processing should be examined apart from considerations involving the saving of money and the reduction of personnel. The proper consideration must be that of evolving the most suitable operating system for the specific, unusual needs of this particular Agency.

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